

CAPACITY AND QUEUE ANALYSIS WORKSHEETS

Capacity and Queue
Analysis Worksheets

3: Allstar Driveway & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Weekday)

6/15/2010

	←	←	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			4
Volume (veh/h)	6	6	113	7	10	109
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Hourly flow rate (vph)	10	10	133	18	13	124
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	293	142			151	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	293	142			151	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	695	911			1442	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	19	151	137
Volume Left	10	0	13
Volume Right	10	18	0
cSH	789	1700	1442
Volume to Capacity	0.02	0.09	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	9.7	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		23.0%	ICU Level of Service A
Analysis Period (min)		15	

$$\text{Overall LOS} = \frac{212}{251} = 0.8 \text{ sec/veh} = \text{LOS A}$$

3: Allstar Driveway & Emmitsburg Road

2012 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		1		1	1
Volume (veh/h)	6	6	115	7	10	111
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Hourly flow rate (vph)	10	10	135	18	13	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	297	145			154	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	297	145			154	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	691	908			1439	

Direction, Lane #	WB	NB	SB
Volume Total	19	154	139
Volume Left	10	0	13
Volume Right	10	18	0
cSH	785	1700	1439
Volume to Capacity	0.02	0.09	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	9.7	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

$$\text{Overall LOS} = \frac{213}{255} = 0.8 \text{ sec/veh} = \text{LOS A}$$

3: Allstar Driveway & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	Y
Volume (veh/h)	157	23	115	174	29	111
Sign Control	Stop		Free		Free	
Grade	4%		1%			-1%
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Hourly flow rate (vph)	249	37	135	458	39	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	568	364			593	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	568	364			593	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	95			96	
cM capacity (veh/h)	468	685			993	

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	286	593	165
Volume Left	249	0	39
Volume Right	37	458	0
cSH	488	1700	993
Volume to Capacity	0.59	0.35	0.04
Queue Length 95th (ft)	92	0	3
Control Delay (s)	22.3	0.0	2.3
Lane LOS	C		A
Approach Delay (s)	22.3	0.0	2.3
Approach LOS	C		

Intersection Summary			
Average Delay		6.5	
Intersection Capacity Utilization		44.3%	ICU Level of Service A
Analysis Period (min)		15	

$$\text{Overall LOS} = \frac{4336}{609} = 7.1\% \text{ v/c} = \text{LOS A}$$

3: Allstar Driveway & Emmitsburg Road

2012 Traffic Volumes with Dev & Improvements - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	157	23	115	174	29	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.98		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.99
Satd. Flow (prot)	1695		1809	1553		1810
Flt Permitted	0.96		1.00	1.00		0.89
Satd. Flow (perm)	1695		1809	1553		1632
Peak-hour factor, PHF	0.63	0.63	0.85	0.38	0.75	0.88
Adj. Flow (vph)	249	37	135	458	39	126
RTOR Reduction (vph)	8	0	0	306	0	0
Lane Group Flow (vph)	278	0	135	152	0	165
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type			Perm	Perm		
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	10.9		11.4	11.4		11.4
Effective Green, g (s)	10.9		11.4	11.4		11.4
Actuated g/C Ratio	0.32		0.33	0.33		0.33
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	539		601	516		542
v/s Ratio Prot	c0.16		0.07			
v/s Ratio Perm				0.10		c0.10
v/c Ratio	0.52		0.22	0.30		0.30
Uniform Delay, d1	9.5		8.3	8.5		8.5
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	0.8		0.2	0.3		0.3
Delay (s)	10.4		8.5	8.8		8.8
Level of Service	B		A	A		A
Approach Delay (s)	10.4		8.7			8.8
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	34.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	157	23	115	174	29	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.983			0.850		
Flt Protected	0.958					0.988
Satd. Flow (prot)	1695	0	1809	1553	0	1810
Flt Permitted	0.958					0.891
Satd. Flow (perm)	1695	0	1809	1553	0	1632
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	12			458		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	249	37	135	458	39	126
Shared Lane Traffic (%)						
Lane Group Flow (vph)	286	0	135	458	0	165
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	31.0	0.0	39.0	39.0	39.0	39.0
Total Split (%)	44.3%	0.0%	55.7%	55.7%	55.7%	55.7%
Maximum Green (s)	25.0		33.0	33.0	33.0	33.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.53		0.23	0.56		0.31
Control Delay	13.2		10.4	4.4		11.3
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	13.2		10.4	4.4		11.3
Queue Length 50th (ft)	34		16	0		21
Queue Length 95th (ft)	63		47	0		60
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1322		1691	1482		1526
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.22		0.08	0.31		0.11

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 34.6
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ e2		
39.0		
↓ e6		↙ e8
39.0		31.6

3: Allstar Driveway & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			↑
Volume (veh/h)	6	6	120	7	11	116
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Hourly flow rate (vph)	10	10	141	18	15	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	312	150			160	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	312	150			160	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	678	901			1432	

Direction/Lane #	WB.1	NB.1	SB.1
Volume Total	19	160	146
Volume Left	10	0	15
Volume Right	10	18	0
cSH	774	1700	1432
Volume to Capacity	0.02	0.09	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	9.8	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.8	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

$$\text{Overall LOS} = \frac{219}{266} = 0.819 \text{ sec/veh} = \text{LOS A}$$

3: Allstar Driveway & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			Y
Volume (veh/h)	157	23	120	174	30	116
Sign Control	Stop		Free			Free
Grade %	4%		1%			-1%
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Hourly flow rate (vph)	249	37	141	458	40	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	582	370			599	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	370			599	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF, (s)	3.5	3.3			2.2	
p0 queue free %	46	95			96	
cM capacity (veh/h)	459	680			988	

Direction Lane #	WB, 1	NB, 1	SB, 1
Volume Total	286	599	172
Volume Left	249	0	40
Volume Right	37	458	0
cSH	479	1700	988
Volume to Capacity	0.60	0.35	0.04
Queue Length 95th (ft)	96	0	3
Control Delay (s)	23.1	0.0	2.3
Lane LOS	C		A
Approach Delay (s)	23.1	0.0	2.3
Approach LOS	C		

Intersection Summary			
Average Delay		6.6	
Intersection Capacity Utilization		44.8%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 7.2 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road

2017 Traffic Volumes with Dev & Improvements - PM Peak (Weekday)

6/15/2010




Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	157	23	120	174	30	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.98		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.99
Satd. Flow (prot)	1695		1809	1553		1811
Flt Permitted	0.96		1.00	1.00		0.89
Satd. Flow (perm)	1695		1809	1553		1633
Peak-hour factor, PHF	0.63	0.63	0.85	0.38	0.75	0.88
Adj. Flow (vph)	249	37	141	458	40	132
RTOR Reduction (vph)	8	0	0	303	0	0
Lane Group Flow (vph)	278	0	141	155	0	172
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	10.9		11.7	11.7		11.7
Effective Green, g (s)	10.9		11.7	11.7		11.7
Actuated g/C Ratio	0.32		0.34	0.34		0.34
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	534		612	525		552
v/s Ratio Prot	c0.16		0.08			
v/s Ratio Perm				0.10		c0.11
v/c Ratio	0.52		0.23	0.29		0.31
Uniform Delay, d1	9.7		8.2	8.4		8.5
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	0.9		0.2	0.3		0.3
Delay (s)	10.6		8.4	8.7		8.8
Level of Service	B		A	A		A
Approach Delay (s)	10.6		8.7			8.8
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	34.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↗		↘
Volume (vph)	157	23	120	174	30	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.983			0.850		
Flt Protected	0.958					0.989
Satd. Flow (prot)	1695	0	1809	1553	0	1812
Flt Permitted	0.958					0.892
Satd. Flow (perm)	1695	0	1809	1553	0	1634
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	12			458		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.63	0.63	0.85	0.38	0.75	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	249	37	141	458	40	132
Shared Lane Traffic (%)						
Lane Group Flow (vph)	286	0	141	458	0	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings

3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	31.0	0.0	39.0	39.0	39.0	39.0
Total Split (%)	44.3%	0.0%	55.7%	55.7%	55.7%	55.7%
Maximum Green (s)	25.0		33.0	33.0	33.0	33.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.53		0.23	0.56		0.31
Control Delay	13.5		10.4	4.4		11.3
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	13.5		10.4	4.4		11.3
Queue Length 50th (ft)	34		17	0		22
Queue Length 95th (ft)	63		49	0		62
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1245		1678	1474		1516
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.23		0.08	0.31		0.11

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 34.9
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ ø2		
39 s		
↓ ø6		
39 s		
	↙ ø8	
	31 s	

3: Allstar Driveway & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Friday)

6/15/2010

	←	←	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↑			↗
Volume (veh/h)	3	9	136	29	18	118
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Hourly flow rate (vph)	4	18	153	37	36	146
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	389	171			190	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	389	171			190	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			97	
cM capacity (veh/h)	602	877			1396	

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	22	190	182
Volume Left	4	0	36
Volume Right	18	37	0
cSH	810	1700	1396
Volume to Capacity	0.03	0.11	0.03
Queue Length 95th (ft)	2	0	2
Control Delay (s)	9.6	0.0	1.7
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	1.7
Approach LOS	A		

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization		29.5%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.1 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	9	138	29	18	120
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Hourly flow rate (vph)	4	18	155	37	36	148
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	394	174			192	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	394	174			192	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			97	
cM capacity (veh/h)	598	875			1393	

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	22	192	184
Volume Left	4	0	36
Volume Right	18	37	0
cSH	807	1700	1393
Volume to Capacity	0.03	0.11	0.03
Queue Length 95th (ft)	2	0	2
Control Delay (s)	9.6	0.0	1.7
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	1.7
Approach LOS	A		

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization		29.7%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.1 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	LT	RT	TH	TH	TH	TH
Volume (veh/h)	181	29	138	223	40	120
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Hourly flow rate (vph)	241	58	155	286	80	148
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	606	298			441	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	606	298			441	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	44	92			93	
cM capacity (veh/h)	430	746			1130	

Direction/Lane #	WB	NB	SB
Volume Total	299	441	228
Volume Left	241	0	80
Volume Right	58	286	0
cSH	468	1700	1130
Volume to Capacity	0.64	0.26	0.07
Queue Length 95th (ft)	110	0	6
Control Delay (s)	25.3	0.0	3.4
Lane LOS	D		A
Approach Delay (s)	25.3	0.0	3.4
Approach LOS	D		

Intersection Summary			
Average Delay		8.6	
Intersection Capacity Utilization		51.3%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 8.0 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road

2012 Traffic Volumes with Dev & Improvements - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	181	29	138	223	40	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.97		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.98
Satd. Flow (prot)	1685		1809	1553		1814
Flt Permitted	0.96		1.00	1.00		0.82
Satd. Flow (perm)	1685		1809	1553		1516
Peak-hour factor, PHF	0.75	0.50	0.89	0.78	0.50	0.81
Adj. Flow (vph)	241	58	155	286	80	148
RTOR Reduction (vph)	15	0	0	188	0	0
Lane Group Flow (vph)	284	0	155	98	0	228
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type			Perm		Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	11.5		12.3	12.3		12.3
Effective Green, g (s)	11.5		12.3	12.3		12.3
Actuated g/C Ratio	0.32		0.34	0.34		0.34
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	541		622	534		521
v/s Ratio Prot	c0.17		0.09			
v/s Ratio Perm				0.06		c0.15
v/c Ratio	0.53		0.25	0.18		0.44
Uniform Delay, d1	9.9		8.4	8.2		9.1
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	0.9		0.2	0.2		0.6
Delay (s)	10.8		8.6	8.4		9.7
Level of Service	B		A	A		A
Approach Delay (s)	10.8		8.5			9.7
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	35.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↓
Volume (vph)	181	29	138	223	40	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.974			0.850		
Flt Protected	0.961					0.983
Satd. Flow (prot)	1685	0	1809	1553	0	1814
Flt Permitted	0.961					0.821
Satd. Flow (perm)	1685	0	1809	1553	0	1515
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	22			286		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	241	58	155	286	80	148
Shared Lane Traffic (%)						
Lane Group Flow (vph)	299	0	155	286	0	228
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	36.0	0.0	34.0	34.0	34.0	34.0
Total Split (%)	51.4%	0.0%	48.6%	48.6%	48.6%	48.6%
Maximum Green (s)	30.0		28.0	28.0	28.0	28.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.54		0.25	0.40		0.44
Control Delay	13.3		10.8	3.7		13.3
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	13.3		10.8	3.7		13.3
Queue Length 50th (ft)	38		20	0		32
Queue Length 95th (ft)	79		58	23		78
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1433		1433	1290		1200
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.21		0.11	0.22		0.19

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 36.1
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ ø2					
34 s					
↓ ø6					
34 s				ø8	36 s

3: Allstar Driveway & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	3	10	144	31	19	125
Volume (veh/h)	3	10	144	31	19	125
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Hourly flow rate (vph)	4	20	162	40	38	154
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	412	182			202	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	412	182			202	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			97	
cM capacity (veh/h)	583	866			1382	

Direction/Lane #	WB1	NB1	SB1
Volume Total	24	202	192
Volume Left	4	0	38
Volume Right	20	40	0
cSH	801	1700	1382
Volume to Capacity	0.03	0.12	0.03
Queue Length 95th (ft)	2	0	2
Control Delay (s)	9.6	0.0	1.7
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	1.7
Approach LOS	A		

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization		30.4%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.1 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	T
Volume (veh/h)	181	30	144	225	41	125
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Hourly flow rate (vph)	241	60	162	288	82	154
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	624	306			450	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624	306			450	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	42	92			93	
cM capacity (veh/h)	419	738			1121	

Direction, Lane #	WB, 1	NB, 1	SB, 1
Volume Total	301	450	236
Volume Left	241	0	82
Volume Right	60	288	0
cSH	458	1700	1121
Volume to Capacity	0.66	0.26	0.07
Queue Length 95th (ft)	116	0	6
Control Delay (s)	26.7	0.0	3.4
Lane LOS	D		A
Approach Delay (s)	26.7	0.0	3.4
Approach LOS	D		

Intersection Summary			
Average Delay		9.0	
Intersection Capacity Utilization		52.1%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 8.3 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
 2017 Traffic Volumes with Dev & Improvements - PM Peak (Friday)

6/15/2010










Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	181	30	144	225	41	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.97		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.98
Satd. Flow (prot)	1684		1809	1553		1814
Flt Permitted	0.96		1.00	1.00		0.82
Satd. Flow (perm)	1684		1809	1553		1513
Peak-hour factor, PHF	0.75	0.50	0.89	0.78	0.50	0.81
Adj. Flow (vph)	241	60	162	288	82	154
RTOR Reduction (vph)	15	0	0	189	0	0
Lane Group Flow (vph)	286	0	162	99	0	236
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type			Perm		Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	11.7		12.5	12.5		12.5
Effective Green, g (s)	11.7		12.5	12.5		12.5
Actuated g/C Ratio	0.32		0.35	0.35		0.35
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	544		625	536		522
v/s Ratio Prot	c0.17		0.09			
v/s Ratio Perm				0.06		c0.16
v/c Ratio	0.53		0.26	0.19		0.45
Uniform Delay, d1	10.0		8.5	8.3		9.2
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	0.9		0.2	0.2		0.6
Delay (s)	10.9		8.7	8.5		9.8
Level of Service	B		A	A		A
Approach Delay (s)	10.9		8.6			9.8
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	36.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	181	30	144	225	41	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973			0.850		
Flt Protected	0.962					0.983
Satd. Flow (prot)	1685	0	1809	1553	0	1814
Flt Permitted	0.962					0.820
Satd. Flow (perm)	1685	0	1809	1553	0	1514
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	22			288		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.75	0.50	0.89	0.78	0.50	0.81
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	241	60	162	288	82	154
Shared Lane Traffic (%)						
Lane Group Flow (vph)	301	0	162	288	0	236
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings

3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	36.0	0.0	34.0	34.0	34.0	34.0
Total Split (%)	51.4%	0.0%	48.6%	48.6%	48.6%	48.6%
Maximum Green (s)	30.0		28.0	28.0	28.0	28.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.54		0.26	0.40		0.45
Control Delay	13.5		10.9	3.7		13.5
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	13.5		10.9	3.7		13.5
Queue Length 50th (ft)	39		21	0		33
Queue Length 95th (ft)	81		62	23		81
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1420		1419	1281		1188
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.21		0.11	0.22		0.20

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 36.5
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ 02	
34 s	
↓ 06	↙ 08
34 s	36 s

3: Allstar Driveway & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑			↓
Volume (veh/h)	10	12	99	9	13	135
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Hourly flow rate (vph)	26	19	148	13	24	161
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	362	154			161	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	362	154			161	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			98	
cM capacity (veh/h)	630	897			1430	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	45	161	184
Volume Left	26	0	24
Volume Right	19	13	0
cSH	720	1700	1430
Volume to Capacity	0.06	0.09	0.02
Queue Length 95th (ft)	5	0	1
Control Delay (s)	10.3	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	10.3	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization		24.5%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road

2012 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	T
Volume (veh/h)	10	12	101	9	13	137
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Hourly flow rate (vph)	26	19	151	13	24	163
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	368	157			164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368	157			164	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			98	
cM capacity (veh/h)	625	893			1427	

Direction Lane #	WBL	NB	SB
Volume Total	45	164	187
Volume Left	26	0	24
Volume Right	19	13	0
cSH	715	1700	1427
Volume to Capacity	0.06	0.10	0.02
Queue Length 95th (ft)	5	0	1
Control Delay (s)	10.4	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	10.4	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization		24.6%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			4
Volume (veh/h)	204	34	101	236	38	137
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Hourly flow rate (vph)	537	54	151	352	69	163
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	628	327			503	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	628	327			503	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	92			94	
cM capacity (veh/h)	420	719			1072	

Direction Lane #	WBL	NB	SB
Volume Total	591	503	232
Volume Left	537	0	69
Volume Right	54	352	0
cSH	437	1700	1072
Volume to Capacity	1.35	0.30	0.06
Queue Length 95th (ft)	684	0	5
Control Delay (s)	198.8	0.0	3.0
Lane LOS	F		A
Approach Delay (s)	198.8	0.0	3.0
Approach LOS	F		

Intersection Summary			
Average Delay		89.1	
Intersection Capacity Utilization		52.5%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 63.8 sec/veh = LOS F

3: Allstar Driveway & Emmitsburg Road

2012 Traffic Volumes with Dev & Improvements - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↓
Volume (vph)	204	34	101	236	38	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.99		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.99
Satd. Flow (prot)	1700		1827	1553		1806
Flt Permitted	0.96		1.00	1.00		0.85
Satd. Flow (perm)	1700		1827	1553		1550
Peak-hour factor, PHF	0.38	0.63	0.67	0.67	0.55	0.84
Adj. Flow (vph)	537	54	151	352	69	163
RTOR Reduction (vph)	6	0	0	254	0	0
Lane Group Flow (vph)	585	0	151	98	0	232
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	21.4		12.9	12.9		12.9
Effective Green, g (s)	21.4		12.9	12.9		12.9
Actuated g/C Ratio	0.46		0.28	0.28		0.28
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	786		509	433		432
v/s Ratio Prot	c0.34		0.08			
v/s Ratio Perm				0.06		c0.15
v/c Ratio	0.74		0.30	0.23		0.54
Uniform Delay, d1	10.2		13.1	12.9		14.2
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	3.8		0.3	0.3		1.3
Delay (s)	14.1		13.5	13.1		15.5
Level of Service	B		B	B		B
Approach Delay (s)	14.1		13.2			15.5
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	46.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	←	←	↑	↑	←	←
Volume (vph)	204	34	101	236	38	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.988			0.850		
Flt Protected	0.957					0.985
Satd. Flow (prot)	1702	0	1827	1553	0	1805
Flt Permitted	0.957					0.846
Satd. Flow (perm)	1702	0	1827	1553	0	1551
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	11			352		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Adj. Flow (vph)	537	54	151	352	69	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	591	0	151	352	0	232
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	42.0	0.0	28.0	28.0	28.0	28.0
Total Split (%)	60.0%	0.0%	40.0%	40.0%	40.0%	40.0%
Maximum Green (s)	36.0		22.0	22.0	22.0	22.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.76		0.30	0.52		0.55
Control Delay	18.1		17.3	5.5		21.9
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	18.1		17.3	5.5		21.9
Queue Length 50th (ft)	112		30	0		50
Queue Length 95th (ft)	75		65	10		131
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1347		919	956		780
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.44		0.16	0.37		0.30

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 47.2
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ 02	
28s	
↓ 06	↘ 08
28s	42s

3: Allstar Driveway & Emmitsburg Road

2017 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		Y		Y	Y
Volume (veh/h)	11	13	105	10	14	143
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Hourly flow rate (vph)	29	21	157	15	25	170
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	385	164			172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	385	164			172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	98			98	
cM capacity (veh/h)	610	885			1418	

Direction/Lane #	WBL	NBL	SBL
Volume Total	50	172	196
Volume Left	29	0	25
Volume Right	21	15	0
cSH	701	1700	1418
Volume to Capacity	0.07	0.10	0.02
Queue Length 95th (ft)	6	0	1
Control Delay (s)	10.5	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	10.5	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization		25.0%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

3: Allstar Driveway & Emmitsburg Road
 2017 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Volume (veh/h)	205	35	105	237	39	143
Sign Control	Stop		Free			Free
Grade	4%		1%			-1%
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Hourly flow rate (vph)	539	56	157	354	71	170
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	646	334			510	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	646	334			510	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	92			93	
cM capacity (veh/h)	410	713			1065	

Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	595	510	241
Volume Left	539	0	71
Volume Right	56	354	0
cSH	427	1700	1065
Volume to Capacity	1.39	0.30	0.07
Queue Length 95th (ft)	720	0	5
Control Delay (s)	217.2	0.0	3.0
Lane LOS	F		A
Approach Delay (s)	217.2	0.0	3.0
Approach LOS	F		

Intersection Summary			
Average Delay		96.5	
Intersection Capacity Utilization		53.3%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 68.9 sec/veh = LOS F

3: Allstar Driveway & Emmitsburg Road

2017 Traffic Volumes with Dev & Improvements - PM Peak (Saturday)

6/15/2010




Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑		↑
Volume (vph)	205	35	105	237	39	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Total Lost time (s)	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	0.99		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		0.99
Satd. Flow (prot)	1700		1827	1553		1806
Flt Permitted	0.96		1.00	1.00		0.84
Satd. Flow (perm)	1700		1827	1553		1548
Peak-hour factor, PHF	0.38	0.63	0.67	0.67	0.55	0.84
Adj. Flow (vph)	539	56	157	354	71	170
RTOR Reduction (vph)	6	0	0	254	0	0
Lane Group Flow (vph)	589	0	157	100	0	241
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	21.7		13.2	13.2		13.2
Effective Green, g (s)	21.7		13.2	13.2		13.2
Actuated g/C Ratio	0.46		0.28	0.28		0.28
Clearance Time (s)	6.0		6.0	6.0		6.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	787		514	437		436
v/s Ratio Prot	c0.35		0.09			
v/s Ratio Perm				0.06		c0.16
v/c Ratio	0.75		0.31	0.23		0.55
Uniform Delay, d1	10.4		13.2	12.9		14.3
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	3.9		0.3	0.3		1.5
Delay (s)	14.3		13.6	13.2		15.9
Level of Service	B		B	B		B
Approach Delay (s)	14.3		13.3			15.9
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↗		↖
Volume (vph)	205	35	105	237	39	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	4%		1%			-1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.987			0.850		
Flt Protected	0.957					0.985
Satd. Flow (prot)	1700	0	1827	1553	0	1805
Flt Permitted	0.957					0.845
Satd. Flow (perm)	1700	0	1827	1553	0	1549
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	11			354		
Link Speed (mph)	25		40			40
Link Distance (ft)	597		468			377
Travel Time (s)	16.3		8.0			6.4
Peak Hour Factor	0.38	0.63	0.67	0.67	0.55	0.84
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Adj. Flow (vph)	539	56	157	354	71	170
Shared Lane Traffic (%)						
Lane Group Flow (vph)	595	0	157	354	0	241
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.05	1.05	1.04	1.04
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (ft)	20		100	20	20	100
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		6	20	20	6
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type				Perm	Perm	
Protected Phases	8		2			6
Permitted Phases				2	6	
Detector Phase	8		2	2	6	6

Lanes, Volumes, Timings
3: Allstar Driveway & Emmitsburg Road

6/15/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	22.0		22.0	22.0	22.0	22.0
Total Split (s)	42.0	0.0	28.0	28.0	28.0	28.0
Total Split (%)	60.0%	0.0%	40.0%	40.0%	40.0%	40.0%
Maximum Green (s)	36.0		22.0	22.0	22.0	22.0
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Min	Min	Min	Min
Walk Time (s)	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
v/c Ratio	0.77		0.31	0.52		0.56
Control Delay	18.5		17.4	5.4		22.2
Queue Delay	0.0		0.0	0.0		0.0
Total Delay	18.5		17.4	5.4		22.2
Queue Length 50th (ft)	116		32	0		53
Queue Length 95th (ft)	78		67	10		135
Internal Link Dist (ft)	517		388			297
Turn Bay Length (ft)						
Base Capacity (vph)	1329		906	948		768
Starvation Cap Reductn	0		0	0		0
Spillback Cap Reductn	0		0	0		0
Storage Cap Reductn	0		0	0		0
Reduced v/c Ratio	0.45		0.17	0.37		0.31

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 47.9
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Allstar Driveway & Emmitsburg Road

↑ ø2	
28 s	
↓ ø6	↘ ø8
28 s	42 s

5: Barlow Greenmount Road & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			↑
Volume (veh/h)	8	14	115	14	15	114
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.58	0.60	0.83	0.75	0.54	0.85
Hourly flow rate (vph)	14	23	139	19	28	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	338	148			157	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	338	148			157	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			98	
cM capacity (veh/h)	649	904			1435	

Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	37	157	162
Volume Left	14	0	28
Volume Right	23	19	0
cSH	789	1700	1435
Volume to Capacity	0.05	0.09	0.02
Queue Length 95th (ft)	4	0	1
Control Delay (s)	9.8	0.0	1.4
Lane LOS	A		A
Approach Delay (s)	9.8	0.0	1.4
Approach LOS	A		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization		27.1%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010

	←	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑			↓
Volume (veh/h)	8	14	117	14	15	116
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.58	0.60	0.83	0.75	0.54	0.85
Hourly flow rate (vph)	14	23	141	19	28	136
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	342	150			160	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342	150			160	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			98	
cM capacity (veh/h)	645	901			1432	

Direction/Lane #	WBL	NBL	SBL
Volume Total	37	160	164
Volume Left	14	0	28
Volume Right	23	19	0
cSH	785	1700	1432
Volume to Capacity	0.05	0.09	0.02
Queue Length 95th (ft)	4	0	1
Control Delay (s)	9.8	0.0	1.4
Lane LOS	A		A
Approach Delay (s)	9.8	0.0	1.4
Approach LOS	A		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization		27.3%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Volume (veh/h)	10	14	132	16	15	133
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.58	0.60	0.83	0.75	0.54	0.85
Hourly flow rate (vph)	17	23	159	21	28	156
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	382	170			180	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382	170			180	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	97			98	
cM capacity (veh/h)	612	879			1407	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	41	180	184
Volume Left	17	0	28
Volume Right	23	21	0
cSH	742	1700	1407
Volume to Capacity	0.05	0.11	0.02
Queue Length 95th (ft)	4	0	2
Control Delay (s)	10.1	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		29.1%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 1.4 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2017 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑			↑
Volume (veh/h)	8	15	122	15	16	121
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.58	0.60	0.83	0.75	0.54	0.85
Hourly flow rate (vph)	14	25	147	20	30	142
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	359	157			167	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	157			167	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			98	
cM capacity (veh/h)	630	894			1423	

Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	39	167	172
Volume Left	14	0	30
Volume Right	25	20	0
cSH	778	1700	1423
Volume to Capacity	0.05	0.10	0.02
Queue Length 95th (ft)	4	0	2
Control Delay (s)	9.9	0.0	1.4
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	1.4
Approach LOS	A		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization		27.9%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.4 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBT	SBT
Lane Configurations	Y		Y		Y	Y
Volume (veh/h)	10	15	137	17	16	138
Sign Control	Stop		Free			Free
Grade (%)	1%		-1%			1%
Peak Hour Factor	0.58	0.60	0.83	0.75	0.54	0.85
Hourly flow rate (vph)	17	25	165	23	30	162
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	398	176			188	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	398	176			188	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	97			98	
CM capacity (veh/h)	598	872			1399	

Direction Lane #	WB, 1	NB, 1	SB, 1
Volume Total	42	188	192
Volume Left	17	0	30
Volume Right	25	23	0
cSH	735	1700	1399
Volume to Capacity	0.06	0.11	0.02
Queue Length 95th (ft)	5	0	2
Control Delay (s)	10.2	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	10.2	0.0	1.3
Approach LOS	B		

Intersection Summary		
Average Delay	1.6	
Intersection Capacity Utilization	29.7%	ICU Level of Service: A
Analysis Period (min)	15	

Overall LOS = 1.4 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↑		↱	↱
Volume (veh/h)	9	6	122	17	12	91
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.63	0.86	0.42	0.50	0.86
Hourly flow rate (vph)	18	10	142	40	24	106
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	316	162			182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	316	162			182	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			98	
cM capacity (veh/h)	670	888			1405	

Direction/Lane #	WB	NB	SB
Volume Total	28	182	130
Volume Left	18	0	24
Volume Right	10	40	0
cSH	732	1700	1405
Volume to Capacity	0.04	0.11	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	10.1	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		24.9%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 1.2 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	T
Volume (veh/h)	9	6	124	17	12	93
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.63	0.86	0.42	0.50	0.86
Hourly flow rate (vph)	18	10	144	40	24	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	321	164			185	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321	164			185	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			98	
cM capacity (veh/h)	665	885			1402	

Direction Lane #	WB	NB	SB
Volume Total	28	185	132
Volume Left	18	0	24
Volume Right	10	40	0
cSH	728	1700	1402
Volume to Capacity	0.04	0.11	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	10.1	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		25.0%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 1.2 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Volume (veh/h)	11	6	142	19	12	112
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.63	0.86	0.42	0.50	0.86
Hourly flow rate (vph)	22	10	165	45	24	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	366	188			210	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	366	188			210	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			98	
cM capacity (veh/h)	626	859			1372	

Direction/Lane #	WBL	NBL	SBL
Volume Total	32	210	154
Volume Left	22	0	24
Volume Right	10	45	0
cSH	682	1700	1372
Volume to Capacity	0.05	0.12	0.02
Queue Length 95th (ft)	4	0	1
Control Delay (s)	10.5	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	10.5	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		25.9%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.1 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	LT	RT	TH	TH	LT	RT
Volume (veh/h)	10	6	129	18	13	96
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.63	0.86	0.42	0.50	0.86
Hourly flow rate (vph)	20	10	150	43	26	112
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	335	171			193	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335	171			193	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			98	
cM capacity (veh/h)	652	877			1393	

Direction/Lane #	WB, 1	NB, 1	SB, 1
Volume Total	30	193	138
Volume Left	20	0	26
Volume Right	10	43	0
cSH	711	1700	1393
Volume to Capacity	0.04	0.11	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	10.3	0.0	1.6
Lane LOS	B		A
Approach Delay (s)	10.3	0.0	1.6
Approach LOS	B		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		26.0%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.2 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			↑
Volume (veh/h)	12	6	147	20	13	115
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.63	0.86	0.42	0.50	0.86
Hourly flow rate (vph)	24	10	171	48	26	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	380	195			219	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380	195			219	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			98	
cM capacity (veh/h)	614	852			1363	

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	34	219	160
Volume Left	24	0	26
Volume Right	10	48	0
cSH	667	1700	1363
Volume to Capacity	0.05	0.13	0.02
Queue Length 95th (ft)	4	0	1
Control Delay (s)	10.7	0.0	1.4
Lane LOS	B		A
Approach Delay (s)	10.7	0.0	1.4
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 1.2^{sec/veh} = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Volume (veh/h)	23	7	110	15	6	117
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.38	0.77	0.65	0.63	0.82
Hourly flow rate (vph)	46	18	143	23	10	143
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	316	154			166	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	316	154			166	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			99	
cM capacity (veh/h)	676	897			1424	

Direction/Lane #	WB:1	NB:1	SB:1
Volume Total	64	166	152
Volume Left	46	0	10
Volume Right	18	23	0
cSH	728	1700	1424
Volume to Capacity	0.09	0.10	0.01
Queue Length 95th (ft)	7	0	1
Control Delay (s)	10.4	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	10.4	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 1.3 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	
Volume (veh/h)	23	7	112	15	6	119
Sign Control	Stop		Free		Free	
Grade	1%		-1%		1%	
Peak Hour Factor	0.50	0.38	0.77	0.65	0.63	0.82
Hourly flow rate (vph)	46	18	145	23	10	145
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	321	157			169	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321	157			169	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			99	
cM capacity (veh/h)	672	894			1421	

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	64	169	155
Volume Left	46	0	10
Volume Right	18	23	0
cSH	723	1700	1421
Volume to Capacity	0.09	0.10	0.01
Queue Length 95th (ft)	7	0	1
Control Delay (s)	10.5	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	10.5	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization		21.2%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 1.3 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	2	2	1	1	2	2
Volume (veh/h)	26	7	131	17	6	142
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.38	0.77	0.65	0.63	0.82
Hourly flow rate (vph)	52	18	170	26	10	173
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	375	183			196	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375	183			196	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	98			99	
cM capacity (veh/h)	625	864			1389	

Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	70	196	183
Volume Left	52	0	10
Volume Right	18	26	0
cSH	674	1700	1389
Volume to Capacity	0.10	0.12	0.01
Queue Length 95th (ft)	9	0	1
Control Delay (s)	11.0	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	11.0	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization		22.3%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 1.3 sec/veh = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2017 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	
Volume (veh/h)	24	7	117	16	6	124
Sign Control	Stop		Free		Free	
Grade	1%		-1%		1%	
Peak Hour Factor	0.50	0.38	0.77	0.65	0.63	0.82
Hourly flow rate (vph)	48	18	152	25	10	151
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	335	164			177	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335	164			177	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			99	
cM capacity (veh/h)	660	886			1412	

Direction, Lane #	WBL	NBL	SBL
Volume Total	66	177	161
Volume Left	48	0	10
Volume Right	18	25	0
cSH	710	1700	1412
Volume to Capacity	0.09	0.10	0.01
Queue Length 95th (ft)	8	0	1
Control Delay (s)	10.6	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 1.3^{sec/veh} = LOS A

5: Barlow Greenmount Road & Emmitsburg Road
 2017 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movements	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Volume (veh/h)	27	7	136	18	6	147
Sign Control	Stop		Free			Free
Grade	1%		-1%			1%
Peak Hour Factor	0.50	0.38	0.77	0.65	0.63	0.82
Hourly flow rate (vph)	54	18	177	28	10	179
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	389	190			204	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	389	190			204	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	98			99	
cM capacity (veh/h)	614	856			1379	
















Direction/Lane #	WB	NB	SB
Volume Total	72	204	189
Volume Left	54	0	10
Volume Right	18	28	0
cSH	662	1700	1379
Volume to Capacity	0.11	0.12	0.01
Queue Length 95th (ft)	9	0	1
Control Delay (s)	11.1	0.0	0.4
Lane LOS	B		A
Approach Delay (s)	11.1	0.0	0.4
Approach LOS	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 1.3^{sec/vol} = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Weekday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	37	0	82	0	200	0	0	62	64
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.25	0.82	0.92	0.81	0.92	0.92	0.86	0.80
Hourly flow rate (vph)	0	0	0	48	0	100	0	247	0	0	72	80
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	359	359	112	359	399	247	152			247		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	359	359	112	359	399	247	152			247		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	92	100	87	100			100		
cM capacity (veh/h)	524	571	946	575	542	787	1441			1331		
Direction, Lane #	WB 1	NB 1	SB 1									
Volume Total	148	247	152									
Volume Left	48	0	0									
Volume Right	100	0	80									
cSH	703	1700	1700									
Volume to Capacity	0.21	0.15	0.09									
Queue Length 95th (ft)	20	0	0									
Control Delay (s)	11.5	0.0	0.0									
Lane LOS	B											
Approach Delay (s)	11.5	0.0	0.0									
Approach LOS	B											

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.1 sec/veh = Los A

9: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	38	0	83	0	203	0	0	63	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.25	0.82	0.92	0.81	0.92	0.92	0.86	0.80
Hourly flow rate (vph)	0	0	0	49	0	101	0	251	0	0	73	81
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	364	364	114	364	405	251	155			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	364	364	114	364	405	251	155			251		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	91	100	87	100			100		
cM capacity (veh/h)	518	567	944	570	538	783	1438			1327		

Direction/Lane #	SWB 1	NB 1	SB 1
Volume Total	151	251	155
Volume Left	49	0	0
Volume Right	101	0	81
cSH	698	1700	1700
Volume to Capacity	0.22	0.15	0.09
Queue Length 95th (ft)	20	0	0
Control Delay (s)	11.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.6	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.1 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	38	0	154	0	300	0	0	130	149
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.25	0.82	0.92	0.81	0.92	0.92	0.86	0.80
Hourly flow rate (vph)	0	0	0	49	0	188	0	370	0	0	151	186
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	615	615	244	615	708	370	337			370		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	615	615	244	615	708	370	337			370		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	87	100	72	100			100		
cM capacity (veh/h)	293	409	799	387	362	671	1233			1199		

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	237	370	337
Volume Left	49	0	0
Volume Right	188	0	186
cSH	582	1700	1700
Volume to Capacity	0.41	0.22	0.20
Queue Length 95th (ft)	49	0	0
Control Delay (s)	15.4	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.4	0.0	0.0
Approach LOS	C		
















Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.8 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road

2017 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	39	0	87	0	212	0	0	66	68
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.25	0.82	0.92	0.81	0.92	0.92	0.86	0.80
Hourly flow rate (vph)	0	0	0	51	0	106	0	262	0	0	77	85
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	381	381	119	381	423	262	162			262		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	381	381	119	381	423	262	162			262		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	91	100	86	100			100		
cM capacity (veh/h)	501	555	938	556	525	772	1429			1314		

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	157	262	162
Volume Left	51	0	0
Volume Right	106	0	85
cSH	686	1700	1700
Volume to Capacity	0.23	0.15	0.10
Queue Length 95th (ft)	22	0	0
Control Delay (s)	11.8	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.8	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.2 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	39	0	158	10	309	0	0	133	152
Sign Control		Stop			Stop			Free			Free	
Grade (%)		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.25	0.82	0.92	0.81	0.92	0.92	0.86	0.80
Hourly flow rate (vph)	0	0	0	51	0	193	0	381	0	0	155	190
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	631	631	250	631	726	381	345			381		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	631	631	250	631	726	381	345			381		
IC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	87	100	71	100			100		
cM capacity (veh/h)	281	401	794	377	353	661	1226			1188		
















Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	243	381	345
Volume Left	51	0	0
Volume Right	193	0	190
cSH	572	1700	1700
Volume to Capacity	0.43	0.22	0.20
Queue Length 95th (ft)	53	0	0
Control Delay (s)	15.9	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.9	0.0	0.0
Approach LOS	C		

Intersection Summary	
Average Delay	4.0
Intersection Capacity Utilization	34.9%
Analysis Period (min)	15
ICU Level of Service	A

Overall LOS = 4.0^{sec/veh} = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Friday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	53	1	33	0	169	0	0	113	87
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.78	0.92	0.90	0.92	0.92	0.71	0.81
Hourly flow rate (vph)	0	0	0	58	4	42	0	188	0	0	159	107
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	403	401	213	401	454	188	267			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	403	401	213	401	454	188	267			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	90	99	95	100			100		
cM capacity (veh/h)	530	541	832	556	505	837	1309			1399		
Direction \ Lane #	WB 1	NB 1	SB 1									
Volume Total	104	188	267									
Volume Left	58	0	0									
Volume Right	42	0	107									
cSH	641	1700	1700									
Volume to Capacity	0.16	0.11	0.16									
Queue Length 95th (ft)	14	0	0									
Control Delay (s)	11.7	0.0	0.0									
Lane LOS	B											
Approach Delay (s)	11.7	0.0	0.0									
Approach LOS	B											

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.2 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road

2012 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	54	1	34	0	172	0	0	115	88
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.78	0.92	0.90	0.92	0.92	0.71	0.81
Hourly flow rate (vph)	0	0	0	59	4	44	0	191	0	0	162	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	409	407	216	407	462	191	271			191		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	409	407	216	407	462	191	271			191		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	89	99	95	100			100		
cM capacity (veh/h)	524	536	829	551	500	833	1305			1395		

Direction/Lane #	WB, 1	NB, 1	SB, 1
Volume Total	106	191	271
Volume Left	59	0	0
Volume Right	44	0	109
cSH	637	1700	1700
Volume to Capacity	0.17	0.11	0.16
Queue Length 95th (ft)	15	0	0
Control Delay (s)	11.8	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.8	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.3 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	54	1	116	0	284	0	0	194	187
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.78	0.92	0.90	0.92	0.92	0.71	0.81
Hourly flow rate (vph)	0	0	0	59	4	149	0	316	0	0	273	231
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	706	704	389	704	820	316	504			316		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	706	704	389	704	820	316	504			316		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	83	99	79	100			100		
cM capacity (veh/h)	276	364	664	349	312	709	1071			1256		

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	211	316	504
Volume Left	59	0	0
Volume Right	149	0	231
cSH	541	1700	1700
Volume to Capacity	0.39	0.19	0.30
Queue Length 95th (ft)	46	0	0
Control Delay (s)	15.9	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.9	0.0	0.0
Approach LOS	C		

Intersection Summary		
Average Delay	3.3	
Intersection Capacity Utilization	38.5%	ICU Level of Service
Analysis Period (min)	15	A

Overall LOS = 3.3 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	56	1	35	0	179	0	0	120	92
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.78	0.92	0.90	0.92	0.92	0.71	0.81
Hourly flow rate (vph)	0	0	0	61	4	45	0	199	0	0	169	114
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type									None		None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	427	425	226	425	481	199	283			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	427	425	226	425	481	199	283			199		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	89	99	95	100			100		
cM capacity (veh/h)	509	524	819	536	487	825	1291			1386		

Direction/Lane	WB	NB	SB
Volume Total	110	199	283
Volume Left	61	0	0
Volume Right	45	0	114
cSH	623	1700	1700
Volume to Capacity	0.18	0.12	0.17
Queue Length 95th (ft)	16	0	0
Control Delay (s)	12.0	0.0	0.0
Lane LOS	B		
Approach Delay (s)	12.0	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.3 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↑			↕	
Volume (veh/h)	0	0	0	56	1	117	0	291	0	0	199	191
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.78	0.92	0.90	0.92	0.92	0.71	0.81
Hourly flow rate (vph)	0	0	0	61	4	150	0	323	0	0	280	236
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	724	722	398	722	839	323	516			323		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	724	722	398	722	839	323	516			323		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	82	99	79	100			100		
cM capacity (veh/h)	268	356	656	340	304	702	1060			1248		

Direction, Lane #	WB, 1	NB, 1	SB, 1
Volume Total	215	323	516
Volume Left	61	0	0
Volume Right	150	0	236
cSH	529	1700	1700
Volume to Capacity	0.41	0.19	0.30
Queue Length 95th (ft)	49	0	0
Control Delay (s)	16.4	0.0	0.0
Lane LOS	C		
Approach Delay (s)	16.4	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.3 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Saturday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	22	0	75	0	125	0	0	75	72
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.25	0.85	0.25	0.85	0.92	0.92	0.78	0.90
Hourly flow rate (vph)	0	0	0	32	0	88	0	147	0	0	96	80
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	283	283	136	283	323	147	176			147		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	283	283	136	283	323	147	176			147		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	95	100	90	100			100		
cM capacity (veh/h)	607	629	918	673	598	905	1412			1447		

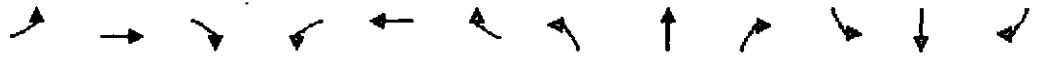
Direction Lane #	WB 1	NB 1	SB 1
Volume Total	120	147	176
Volume Left	32	0	0
Volume Right	88	0	80
cSH	829	1700	1700
Volume to Capacity	0.14	0.09	0.10
Queue Length 95th (ft)	13	0	0
Control Delay (s)	10.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.7^{sec/veh} = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↑			↕	
Volume (veh/h)	0	0	0	22	0	76	0	127	0	0	76	73
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.25	0.85	0.25	0.85	0.92	0.92	0.78	0.90
Hourly flow rate (vph)	0	0	0	32	0	89	0	149	0	0	97	81
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	287	287	138	287	328	149	179			149		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	287	287	138	287	328	149	179			149		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	95	100	90	100			100		
cM capacity (veh/h)	603	626	916	669	594	902	1409			1444		
















Direction Lane #	WB 1	NB 1	SB 1
Volume Total	121	149	179
Volume Left	32	0	0
Volume Right	89	0	81
cSH	827	1700	1700
Volume to Capacity	0.15	0.09	0.11
Queue Length 95th (ft)	13	0	0
Control Delay (s)	10.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.6 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	22	0	172	0	258	0	0	162	181
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.25	0.85	0.25	0.85	0.92	0.92	0.78	0.90
Hourly flow rate (vph)	0	0	0	32	0	202	0	304	0	0	208	201
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	612	612	308	612	712	304	409			304		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	612	612	308	612	712	304	409			304		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	92	100	73	100			100		
cM capacity (veh/h)	297	411	736	408	360	741	1161			1269		

Direction/Lane #	WB 1	NB 1	SB 1
Volume Total	234	304	409
Volume Left	32	0	0
Volume Right	202	0	201
cSH	667	1700	1700
Volume to Capacity	0.35	0.18	0.24
Queue Length 95th (ft)	39	0	0
Control Delay (s)	13.3	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.3	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.2 sec/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↑			↑	
Volume (veh/h)	0	0	0	23	0	80	0	133	0	0	80	76
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.25	0.85	0.25	0.85	0.92	0.92	0.78	0.90
Hourly flow rate (vph)	0	0	0	33	0	94	0	156	0	0	103	84
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	301	301	145	301	343	156	187			156		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	301	301	145	301	343	156	187			156		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	95	100	89	100			100		
cM capacity (veh/h)	586	615	908	655	582	894	1399			1436		

Direction/Lane #	WB	NB	SB
Volume Total	127	156	187
Volume Left	33	0	0
Volume Right	94	0	84
cSH	816	1700	1700
Volume to Capacity	0.16	0.09	0.11
Queue Length 95th (ft)	14	0	0
Control Delay (s)	10.2	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.2	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 2.7^{sec}/veh = LOS A

9: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	23	0	176	0	264	0	0	166	184
Sign Control		Stop			Stop			Free			Free	
Grade		0%			1%			-2%			2%	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.25	0.85	0.25	0.85	0.92	0.92	0.78	0.90
Hourly flow rate (vph)	0	0	0	33	0	207	0	311	0	0	213	204
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	626	626	315	626	728	311	417			311		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	626	626	315	626	728	311	417			311		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	92	100	72	100			100		
cM capacity (veh/h)	287	404	730	400	353	734	1153			1261		

Direction Lane #	WB 1	NB 1	SB 1
Volume Total	240	311	417
Volume Left	33	0	0
Volume Right	207	0	204
cSH	658	1700	1700
Volume to Capacity	0.37	0.18	0.25
Queue Length 95th (ft)	42	0	0
Control Delay (s)	13.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.6	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 3.3 sec/veh = Los A

11: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	13	200	99	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.65	0.81	0.86	0.92
Hourly flow rate (vph)	0	0	20	247	115	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	402	115	115			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	402	115	115			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	99			
cM capacity (veh/h)	599	943	1397			
Direction/Lane #	NB 1	SB 1				
Volume Total	267	115				
Volume Left	20	0				
Volume Right	0	0				
cSH	1397	1700				
Volume to Capacity	0.01	0.07				
Queue Length 95th (ft)	1	0				
Control Delay (s)	0.7	0.0				
Lane LOS	A					
Approach Delay (s)	0.7	0.0				
Approach LOS						

Intersection Summary			
Average Delay	0.5	ICU Level of Service	A
Intersection Capacity Utilization	21.2%		
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2012 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	13	203	101	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.65	0.81	0.86	0.92
Hourly flow rate (vph)	0	0	20	251	117	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	408	117	117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	117	117			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	99			
cM capacity (veh/h)	595	940	1394			









Direction/Lane #	NB 1	SB 1
Volume Total	271	117
Volume Left	20	0
Volume Right	0	0
cSH	1394	1700
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	0.7	0.0
Lane LOS	A	
Approach Delay (s)	0.7	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	13	300	168	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.65	0.81	0.86	0.92
Hourly flow rate (vph)	0	0	20	370	195	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	606	195	195			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	606	195	195			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	457	851	1303			

Direction/Lane #	NB 1	SB 1
Volume Total	390	195
Volume Left	20	0
Volume Right	0	0
cSH	1303	1700
Volume to Capacity	0.02	0.11
Queue Length 95th (ft)	1	0
Control Delay (s)	0.5	0.0
Lane LOS	A	
Approach Delay (s)	0.5	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.3 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2017 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Volume (veh/h)	0	0	14	212	105	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.65	0.81	0.86	0.92
Hourly flow rate (vph)	0	0	22	262	122	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	427	122	122			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	427	122	122			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	579	934	1388			

Direction Lane #	NB 1	SB 1
Volume Total	283	122
Volume Left	22	0
Volume Right	0	0
cSH	1388	1700
Volume to Capacity	0.02	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	0.7	0.0
Lane LOS	A	
Approach Delay (s)	0.7	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	14	309	172	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.65	0.81	0.86	0.92
Hourly flow rate (vph)	0	0	22	381	200	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	625	200	200			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	625	200	200			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tE (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	445	846	1298			

Direction/Lane #	NB 1	SB 1
Volume Total	403	200
Volume Left	22	0
Volume Right	0	0
cSH	1298	1700
Volume to Capacity	0.02	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.4 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Friday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	17	169	146	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.85	0.90	0.71	0.92
Hourly flow rate (vph)	0	0	20	188	206	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	433	206	206			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	433	206	206			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	574	840	1308			

Direction/Lane #	NB 1	SB 1
Volume Total	208	206
Volume Left	20	0
Volume Right	0	0
cSH	1308	1700
Volume to Capacity	0.02	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	0.9	0.0
Lane LOS	A	
Approach Delay (s)	0.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2012 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Volume (veh/h)	0	0	17	172	149	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.85	0.90	0.71	0.92
Hourly flow rate (vph)	0	0	20	191	210	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	441	210	210			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441	210	210			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	569	835	1304			

Direction, Lane #	NB 1	SB 1
Volume Total	211	210
Volume Left	20	0
Volume Right	0	0
cSH	1304	1700
Volume to Capacity	0.02	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	0.9	0.0
Lane LOS	A	
Approach Delay (s)	0.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBR	ENBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	17	284	228	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.85	0.90	0.71	0.92
Hourly flow rate (vph)	0	0	20	316	321	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	677	321	321			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	677	321	321			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	414	724	1184			

Direction/Lane #	NB 1	SB 1
Volume Total	336	321
Volume Left	20	0
Volume Right	0	0
cSH	1184	1700
Volume to Capacity	0.02	0.19
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.3 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	18	179	155	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.85	0.90	0.71	0.92
Hourly flow rate (vph)	0	0	21	199	218	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	460	218	218			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	460	218	218			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	554	826	1294			

Direction/Lane #	NB 1	SB 1
Volume Total	220	218
Volume Left	21	0
Volume Right	0	0
cSH	1294	1700
Volume to Capacity	0.02	0.13
Queue Length 95th (ft)	1	0
Control Delay (s)	0.9	0.0
Lane LOS	A	
Approach Delay (s)	0.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.5 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Volume (veh/h)	0	0	18	291	234	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.85	0.90	0.71	0.92
Hourly flow rate (vph)	0	0	21	323	330	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	695	330	330			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	695	330	330			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	100	98			
cM capacity (veh/h)	404	717	1176			

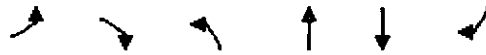
Direction, Lane #	NB, 1	SB, 1
Volume Total	345	330
Volume Left	21	0
Volume Right	0	0
cSH	1176	1700
Volume to Capacity	0.02	0.19
Queue Length 95th (ft)	1	0
Control Delay (s)	0.7	0.0
Lane LOS	A	
Approach Delay (s)	0.7	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.4 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	6	125	97	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.50	0.85	0.78	0.92
Hourly flow rate (vph)	0	0	12	147	124	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	295	124	124			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295	124	124			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	694	932	1475			

Direction/Lane #	NB 1	SB 1
Volume Total	159	124
Volume Left	12	0
Volume Right	0	0
cSH	1475	1700
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.3 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Volume (veh/h)	0	0	6	127	99	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.50	0.85	0.78	0.92
Hourly flow rate (vph)	0	0	12	149	127	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	300	127	127			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	300	127	127			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	690	929	1472			

Direction/Lane #	NB 1	SB 1
Volume Total	161	127
Volume Left	12	0
Volume Right	0	0
cSH	1472	1700
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	14.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.3^{sec/veh} = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2012 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010

	EBL	EBR	NBL	NBT	SBT	SBR
Movement						
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	6	258	185	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.50	0.85	0.78	0.92
Hourly flow rate (vph)	0	0	12	304	237	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	565	237	237			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	565	237	237			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	485	807	1342			
Direction, Lane #	NB 1	SB 1				
Volume Total	316	237				
Volume Left	12	0				
Volume Right	0	0				
cSH	1342	1700				
Volume to Capacity	0.01	0.14				
Queue Length 95th (ft)	1	0				
Control Delay (s)	0.4	0.0				
Lane LOS	A					
Approach Delay (s)	0.4	0.0				
Approach LOS						

Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		21.7%		ICU Level of Service		A
Analysis Period (min)		15				

Overall LOS = 0.2 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
 2017 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕	↕	
Volume (veh/h)	0	0	6	133	103	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.50	0.85	0.78	0.92
Hourly flow rate (vph)	0	0	12	156	132	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	313	132	132			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	313	132	132			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	679	923	1465			

Direction Lane #	NB 1	SB 1
Volume Total	168	132
Volume Left	12	0
Volume Right	0	0
cSH	1465	1700
Volume to Capacity	0.01	0.08
Queue Length 95th (ft)	1	0
Control Delay (s)	0.6	0.0
Lane LOS	A	
Approach Delay (s)	0.6	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.3 sec/veh = LOS A

11: Route 15 SB On Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Volume (veh/h)	0	0	6	264	189	0
Sign Control	Stop			Free	Free	
Grade	0%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.50	0.85	0.78	0.92
Hourly flow rate (vph)	0	0	12	311	242	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	577	242	242			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	577	242	242			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	478	801	1336			

Direction/Lane #	NB 1	SB 1
Volume Total	323	242
Volume Left	12	0
Volume Right	0	0
cSH	1336	1700
Volume to Capacity	0.01	0.14
Queue Length 95th (ft)	1	0
Control Delay (s)	0.4	0.0
Lane LOS	A	
Approach Delay (s)	0.4	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 0.2 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Volume (veh/h)	147	0	11	0	0	0	0	65	37	33	67	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.80	0.25	0.69	0.92	0.92	0.92	0.92	0.86	0.62	0.69	0.84	0.92
Hourly flow rate (vph)	184	0	16	0	0	0	0	76	60	48	80	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	281	311	80	281	281	105	80			135		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	281	311	80	281	281	105	80			135		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	100	98	100	100	100	100			97		
cM capacity (veh/h)	656	587	961	647	610	954	1531			1443		
















Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	200	135	128
Volume Left	184	0	48
Volume Right	16	60	0
cSH	673	1700	1443
Volume to Capacity	0.30	0.08	0.03
Queue Length 95th (ft)	31	0	3
Control Delay (s)	12.6	0.0	3.0
Lane LOS	B		A
Approach Delay (s)	12.6	0.0	3.0
Approach LOS	B		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 6.4 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	0	11	0	0	0	0	66	38	34	68	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.80	0.25	0.69	0.92	0.92	0.92	0.92	0.86	0.62	0.69	0.84	0.92
Hourly flow rate (vph)	188	0	16	0	0	0	0	77	61	49	81	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	287	318	81	287	287	107	81			138		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	287	318	81	287	287	107	81			138		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	100	98	100	100	100	100			97		
cM capacity (veh/h)	650	581	960	641	605	952	1529			1440		

Direction/Lane #	EB 1	NB 1	SB 1
Volume Total	203	138	130
Volume Left	188	0	49
Volume Right	16	61	0
cSH	666	1700	1440
Volume to Capacity	0.31	0.08	0.03
Queue Length 95th (ft)	32	0	3
Control Delay (s)	12.8	0.0	3.0
Lane LOS	B		A
Approach Delay (s)	12.8	0.0	3.0
Approach LOS	B		

Intersection Summary			
Average Delay		6.3	
Intersection Capacity Utilization		27.8%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 6.4 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations		↕						↑			↕	
Volume (veh/h)	243	0	11	0	0	0	0	70	38	98	71	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.80	0.25	0.69	0.92	0.92	0.92	0.92	0.86	0.62	0.69	0.84	0.92
Hourly flow rate (vph)	304	0	16	0	0	0	0	81	61	142	85	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	481	511	85	481	481	112	85			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	481	511	85	481	481	112	85			143		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	34	100	98	100	100	100	100			90		
cM capacity (veh/h)	459	422	955	453	439	946	1525			1434		

Direction Lane #	EB 1	NB 1	SB 1
Volume Total	320	143	227
Volume Left	304	0	142
Volume Right	16	61	0
cSH	471	1700	1434
Volume to Capacity	0.68	0.08	0.10
Queue Length 95th (ft)	125	0	8
Control Delay (s)	27.2	0.0	5.2
Lane LOS	D		A
Approach Delay (s)	27.2	0.0	5.2
Approach LOS	D		

Intersection Summary			
Average Delay	14.3		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 14.7 sec/veh = LOS B

13: Route 15 NB Off Ramp & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Weekday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔						↔			↔	
Volume (veh/h)	156	0	12	0	0	0	0	69	39	35	71	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.80	0.25	0.69	0.92	0.92	0.92	0.92	0.86	0.62	0.69	0.84	0.92
Hourly flow rate (vph)	195	0	17	0	0	0	0	80	63	51	85	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	298	329	85	298	298	112	85			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	298	329	85	298	298	112	85			143		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	98	100	100	100	100			96		
cM capacity (veh/h)	639	572	955	629	596	947	1525			1433		

Direction Lane #	EB 1	NB 1	SB 1
Volume Total	212	143	135
Volume Left	195	0	51
Volume Right	17	63	0
cSH	656	1700	1433
Volume to Capacity	0.32	0.08	0.04
Queue Length 95th (ft)	35	0	3
Control Delay (s)	13.1	0.0	3.0
Lane LOS	B		A
Approach Delay (s)	13.1	0.0	3.0
Approach LOS	B		

Intersection Summary		
Average Delay	6.5	
Intersection Capacity Utilization	28.4%	ICU Level of Service
Analysis Period (min)	15	A

Overall LOS = 6.6 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Weekday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔						↑			↑	
Volume (veh/h)	249	0	12	0	0	0	0	73	39	99	74	10
Sign Control		Stop			Stop			Free			Free	
Grade (%)		3%			0%			2%			2%	
Peak Hour Factor	0.80	0.25	0.69	0.92	0.92	0.92	0.92	0.86	0.62	0.69	0.84	0.92
Hourly flow rate (vph)	311	0	17	0	0	0	0	85	63	143	88	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	491	523	88	491	491	116	88			148		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	491	523	88	491	491	116	88			148		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tE (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	31	100	98	100	100	100	100			90		
cM capacity (veh/h)	451	415	951	445	433	941	1520			1428		

Direction Lane #	EB 1	NB 1	SB 1
Volume Total	329	148	232
Volume Left	311	0	143
Volume Right	17	63	0
cSH	464	1700	1428
Volume to Capacity	0.71	0.09	0.10
Queue Length 95th (ft)	137	0	8
Control Delay (s)	29.5	0.0	5.1
Lane LOS	D		A
Approach Delay (s)	29.5	0.0	5.1
Approach LOS	D		

Intersection Summary		
Average Delay	15.4	
Intersection Capacity Utilization	37.2%	ICU Level of Service
Analysis Period (min)	15	A

Overall LOS = 15.7 sec/veh = LOS C

13: Route 15 NB Off Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Friday)

6/15/2010

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Volume (veh/h)	131	0	4	0	0	0	0	76	39	64	70	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.86	0.25	0.50	0.92	0.92	0.92	0.92	0.76	0.81	0.84	0.88	0.92
Hourly flow rate (vph)	152	0	8	0	0	0	0	100	48	76	80	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	356	380	80	356	356	124	80			148		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	356	380	80	356	356	124	80			148		
tC, single (s)	7.2	6.5	6.5	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	73	100	99	100	100	100	100			95		
cM capacity (veh/h)	569	525	920	573	542	932	1531			1397		

Direction \ Lane #	EB 1	NB 1	SB 1
Volume Total	160	148	156
Volume Left	152	0	76
Volume Right	8	48	0
cSH	580	1700	1397
Volume to Capacity	0.28	0.09	0.05
Queue Length 95th (ft)	28	0	4
Control Delay (s)	13.6	0.0	4.0
Lane LOS	B		A
Approach Delay (s)	13.6	0.0	4.0
Approach LOS	B		

Intersection Summary			
Average Delay		6.0	
Intersection Capacity Utilization		28.1%	ICU Level of Service A
Analysis Period (min)		15	

Overall LOS = 6.2 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↑			↑	
Volume (veh/h)	133	0	4	0	0	0	0	77	40	65	71	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.86	0.25	0.50	0.92	0.92	0.92	0.92	0.76	0.81	0.84	0.88	0.92
Hourly flow rate (vph)	155	0	8	0	0	0	0	101	49	77	81	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	361	386	81	361	361	126	81			151		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	361	386	81	361	361	126	81			151		
tC, single (s)	7.2	6.5	6.5	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	73	100	99	100	100	100	100			94		
cM capacity (veh/h)	563	520	919	568	537	930	1530			1394		

Direction Lane #	EB 1	NB 1	SB 1
Volume Total	163	151	158
Volume Left	155	0	77
Volume Right	8	49	0
cSH	574	1700	1394
Volume to Capacity	0.28	0.09	0.06
Queue Length 95th (ft)	29	0	4
Control Delay (s)	13.7	0.0	4.0
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	4.0
Approach LOS	B		

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 6.2 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔						↑			↑	
Volume (veh/h)	241	0	4	0	0	0	0	81	40	140	75	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.86	0.25	0.50	0.92	0.92	0.92	0.92	0.76	0.81	0.84	0.88	0.92
Hourly flow rate (vph)	280	0	8	0	0	0	0	107	49	167	85	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	550	575	85	550	550	131	85			156		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	550	575	85	550	550	131	85			156		
tC, single (s)	7.2	6.5	6.5	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	30	100	99	100	100	100	100			88		
cM capacity (veh/h)	400	379	914	404	392	924	1524			1388		

Direction Lane #	EB 1	NB 1	SB 1
Volume Total	288	156	252
Volume Left	280	0	167
Volume Right	8	49	0
cSH	407	1700	1388
Volume to Capacity	0.71	0.09	0.12
Queue Length 95th (ft)	134	0	10
Control Delay (s)	32.7	0.0	5.6
Lane LOS	D		A
Approach Delay (s)	32.7	0.0	5.6
Approach LOS	D		

Intersection Summary		
Average Delay	15.6	
Intersection Capacity Utilization	42.0%	ICU Level of Service
Analysis Period (min)	15	
	A	

Overall LOS = 15.9 sec/veh = LOS C

13: Route 15 NB Off Ramp & Emmitsburg Road
2017 Traffic Volumes without Development - PM Peak (Friday)

6/15/2010

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations		↕						↕			↕	
Volume (veh/h)	139	0	4	0	0	0	0	81	41	68	74	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.86	0.25	0.50	0.92	0.92	0.92	0.92	0.76	0.81	0.84	0.88	0.92
Hourly flow rate (vph)	162	0	8	0	0	0	0	107	51	81	84	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	378	403	84	378	378	132	84			157		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	378	403	84	378	378	132	84			157		
tC, single (s)	7.2	6.5	6.5	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	71	100	99	100	100	100	100			94		
cM capacity (veh/h)	548	507	915	552	525	923	1525			1387		


Direction/Lane #	EB 1	NB 1	SB 1
Volume Total	170	157	165
Volume Left	162	0	81
Volume Right	8	51	0
cSH	559	1700	1387
Volume to Capacity	0.30	0.09	0.06
Queue Length 95th (ft)	32	0	5
Control Delay (s)	14.2	0.0	4.0
Lane LOS	B		A
Approach Delay (s)	14.2	0.0	4.0
Approach LOS	B		

Intersection Summary		
Average Delay	6.3	
Intersection Capacity Utilization	32.4%	ICU Level of Service
Analysis Period (min)	15	A

Overall LOS = 6.4 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Friday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Volume (veh/h)	247	0	4	0	0	0	0	85	41	143	78	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.86	0.25	0.50	0.92	0.92	0.92	0.92	0.76	0.81	0.84	0.88	0.92
Hourly flow rate (vph)	287	0	8	0	0	0	0	112	51	170	89	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	566	592	89	566	566	137	89			162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	566	592	89	566	566	137	89			162		
tC, single (s)	7.2	6.5	6.5	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	26	100	99	100	100	100	100			88		
cM capacity (veh/h)	389	370	910	393	382	917	1520			1381		

Direction \ Lane #	EB 1	NB 1	SB 1
Volume Total	295	162	259
Volume Left	287	0	170
Volume Right	8	51	0
cSH	395	1700	1381
Volume to Capacity	0.75	0.10	0.12
Queue Length 95th (ft)	150	0	11
Control Delay (s)	36.5	0.0	5.6
Lane LOS	E		A
Approach Delay (s)	36.5	0.0	5.6
Approach LOS	E		

Intersection Summary			
Average Delay		17.1	
Intersection Capacity Utilization		42.9%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 17.4 sec/veh = LOS C

13: Route 15 NB Off Ramp & Emmitsburg Road
Existing Traffic Volumes - PM Peak (Saturday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Volume (veh/h)	84	0	3	0	0	0	0	45	19	51	56	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.84	0.25	0.38	0.92	0.92	0.92	0.92	0.80	0.68	0.85	0.70	0.92
Hourly flow rate (vph)	100	0	8	0	0	0	0	56	28	60	80	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	270	284	80	270	270	70	80			84		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	270	284	80	270	270	70	80			84		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	100	99	100	100	100	100			96		
cM capacity (veh/h)	656	603	986	660	614	998	1531			1525		
Direction/Lane #	EB 1	NB 1	SB 1									
Volume Total	108	84	140									
Volume Left	100	0	60									
Volume Right	8	28	0									
cSH	672	1700	1525									
Volume to Capacity	0.16	0.05	0.04									
Queue Length 95th (ft)	14	0	3									
Control Delay (s)	11.4	0.0	3.4									
Lane LOS	B		A									
Approach Delay (s)	11.4	0.0	3.4									
Approach LOS	B											

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 5.3 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010

Movement	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕					↕			↕		
Volume (veh/h)	85	0	3	0	0	0	46	19	52	57	0	
Sign Control		Stop			Stop		Free			Free		
Grade		3%			0%		2%			-2%		
Peak Hour Factor	0.84	0.25	0.38	0.92	0.92	0.92	0.80	0.68	0.85	0.70	0.92	
Hourly flow rate (vph)	101	0	8	0	0	0	58	28	61	81	0	
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	275	289	81	275	275	71	81		85			
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	275	289	81	275	275	71	81		85			
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1		4.1			
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2		2.2			
p0 queue free %	84	100	99	100	100	100	100		96			
cM capacity (veh/h)	650	599	984	655	610	997	1529		1524			


Direction/Lane #	EBL	NBL	SBL
Volume Total	109	85	143
Volume Left	101	0	61
Volume Right	8	28	0
cSH	667	1700	1524
Volume to Capacity	0.16	0.05	0.04
Queue Length 95th (ft)	15	0	3
Control Delay (s)	11.5	0.0	3.4
Lane LOS	B		A
Approach Delay (s)	11.5	0.0	3.4
Approach LOS	B		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 5.3 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2012 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔						↑			↔	
Volume (veh/h)	211	0	3	0	0	0	0	51	19	134	61	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.84	0.25	0.38	0.92	0.92	0.92	0.92	0.80	0.68	0.85	0.70	0.92
Hourly flow rate (vph)	251	0	8	0	0	0	0	64	28	158	87	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (fl)												
pX, platoon unblocked												
vC, conflicting volume	480	494	87	480	480	78	87			92		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480	494	87	480	480	78	87			92		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	44	100	99	100	100	100	100			90		
cM capacity (veh/h)	452	429	977	456	437	989	1522			1516		
Direction/Lane #	EB, 1	NB, 1	SB, 1									
Volume Total	259	92	245									
Volume Left	251	0	158									
Volume Right	8	28	0									
cSH	459	1700	1516									
Volume to Capacity	0.56	0.05	0.10									
Queue Length 95th (ft)	85	0	9									
Control Delay (s)	22.5	0.0	5.2									
Lane LOS	C		A									
Approach Delay (s)	22.5	0.0	5.2									
Approach LOS	C											

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 12.2 sec/veh = LOS B

13: Route 15 NB Off Ramp & Emmitsburg Road
 2017 Traffic Volumes without Development - PM Peak (Saturday)

6/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↑			↕	
Volume (veh/h)	89	0	3	0	0	0	0	48	20	54	59	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.84	0.25	0.38	0.92	0.92	0.92	0.92	0.80	0.68	0.85	0.70	0.92
Hourly flow rate (vph)	106	0	8	0	0	0	0	60	29	64	84	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	286	301	84	286	286	75	84			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	286	301	84	286	286	75	84			89		
IC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	99	100	100	100	100			96		
cM capacity (veh/h)	639	589	980	644	601	992	1525			1519		

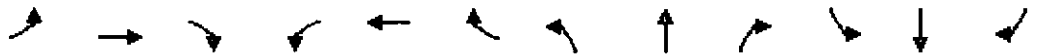
Direction \ Lane #	EB, 1	NB, 1	SB, 1
Volume Total	114	89	148
Volume Left	106	0	64
Volume Right	8	29	0
cSH	655	1700	1519
Volume to Capacity	0.17	0.05	0.04
Queue Length 95th (ft)	16	0	3
Control Delay (s)	11.7	0.0	3.4
Lane LOS	B		A
Approach Delay (s)	11.7	0.0	3.4
Approach LOS	B		

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

Overall LOS = 5.4 sec/veh = LOS A

13: Route 15 NB Off Ramp & Emmitsburg Road
2017 Traffic Volumes with Development - PM Peak (Saturday)

6/15/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↑			↕	
Volume (veh/h)	215	0	3	0	0	0	0	53	20	136	63	0
Sign Control		Stop			Stop			Free			Free	
Grade		3%			0%			2%			-2%	
Peak Hour Factor	0.84	0.25	0.38	0.92	0.92	0.92	0.92	0.80	0.68	0.85	0.70	0.92
Hourly flow rate (vph)	256	0	8	0	0	0	0	66	29	160	90	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	491	506	90	491	491	81	90			96		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	491	506	90	491	491	81	90			96		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	42	100	99	100	100	100	100			89		
cM capacity (veh/h)	443	422	973	448	430	985	1518			1511		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	264	96	250
Volume Left	256	0	160
Volume Right	8	29	0
cSH	451	1700	1511
Volume to Capacity	0.59	0.06	0.11
Queue Length 95th (ft)	92	0	9
Control Delay (s)	23.6	0.0	5.2
Lane LOS	C		A
Approach Delay (s)	23.6	0.0	5.2
Approach LOS	C		

Intersection Summary			
Average Delay		12.4	
Intersection Capacity Utilization		36.3%	ICU Level of Service
Analysis Period (min)		15	A

Overall LOS = 12.6 sec/veh = LOS B

CRASH ANALYSIS

Crash Analysis

Steve Austin

From: Hunter, William [wihunter@state.pa.us]
Sent: Wednesday, January 13, 2010 13:09
To: Steve Austin
Subject: log #9055 Crash Data Request

January 13, 2009

Mr. Steven D. Austin
Senior Traffic Technician
Transportation Resource Group, Inc.
204 North George Street
Suite 110
York, PA 17401
steveaustin@consulttrg.com

Re: Crash Data - Cumberland Township, Adams County
CISAD Log No. 9055

Dear Mr. Austin:

Please note that there were no reportable crashes for a five year period starting from January 1, 2004 through December 31, 2008 for Emmitsburg Road (S.R. 3001) from Segment / Offset 0080 / 1038 to Segment / Offset 0090 / 0078 in Cumberland Township, Adams County and subsequently no reports were generated for it.

If you have any questions, please feel free to contact John Poremba at (717) 705-1471.

William G. Hunter | Crash Reporting Manager
PA Department of Transportation
Bureau of Highway Safety and Traffic Engineering
P O Box 2047 | Harrisburg, PA 17105-2047
Phone: 717-787-2855 | Fax: 717-783-8012
www.dot.state.pa.us

Benjamin Gorman

Cunningham

Steve Austin

From: Hunter, William [wihunter@state.pa.us]
Sent: Tuesday, March 23, 2010 14:07
To: Steve Austin
Subject: log #9228 - Crash Data Request

March 23, 2010

Mr. Steven D. Austin
Senior Traffic Technician
Transportation Resource Group, Inc.
204 North George Street, Suite 110
York, PA 17401-1108
steveaustin@consulttrg.com

Re: Crash Data – Freedom Township, Adams County
CISAD Log No. 9228

Dear Mr. Austin:

No crashes were found for Emmitsburg Road, from segment 0030 at offset 2974 through segment 0050 at offset 1290, for the five year period starting from January 1, 2005 through December 31, 2009. Consequently, no reports were generated.

If you have any questions, please feel free to contact Steve Fink at (717) 783-2295.

William G. Hunter | Crash Reporting Manager
PA Department of Transportation
Bureau of Highway Safety and Traffic Engineering
P O Box 2047 | Harrisburg, PA 17105-2047
Phone: 717-787-2855 | Fax: 717-783-8012
www.dot.state.pa.us

TURN LANE ANALYSIS

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5
 "Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2012 Traffic Volumes with Development

Design Hour: PM Peak (Thursday)

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted ?
Advancing	Left	29	0%	29	No
	Thru	111	1%	112	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	115	1%	116	
	Right	174	0%	174	

Advancing Volumes: 141

Left Turns: 29

Opposing Volumes: 290

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



204 North George Street, Suite 110 • York, PA 17401-1104
 T: (717) 646-4660 • F: (717) 646-4858 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2012 Traffic Volumes with Development

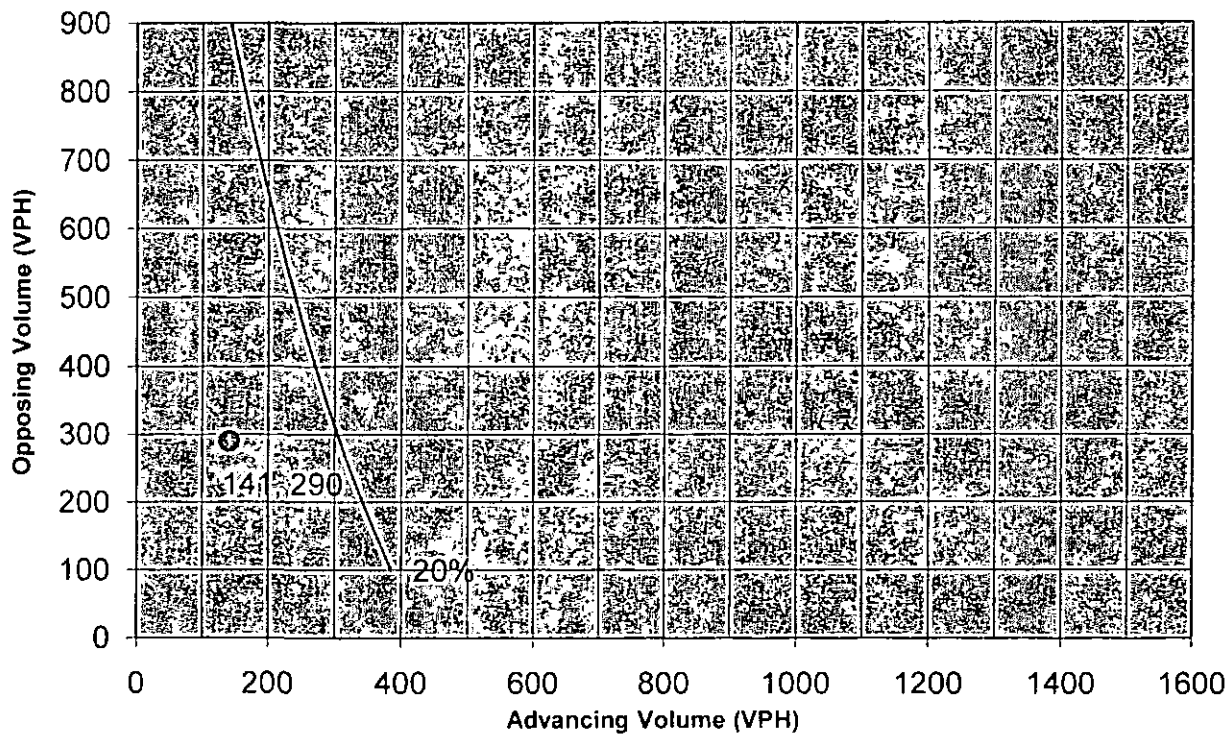
PM Peak (Thursday)

Warrant Graph

Warrant for Left Turns on Two-Lane Highways

Warrant Curve based on Highway Research Record 211

"Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections", M.D. Harmelink



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted



2nd North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-3660 • F: (717) 846-1655 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2017 Traffic Volumes with Development

Design Hour: PM Peak (Thursday)

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted?
Advancing	Left	30	0%	30	No
	Thru	116	1%	117	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	120	1%	121	
	Right	174	0%	174	

Advancing Volumes: 147

Left Turns: 30

Opposing Volumes: 295

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

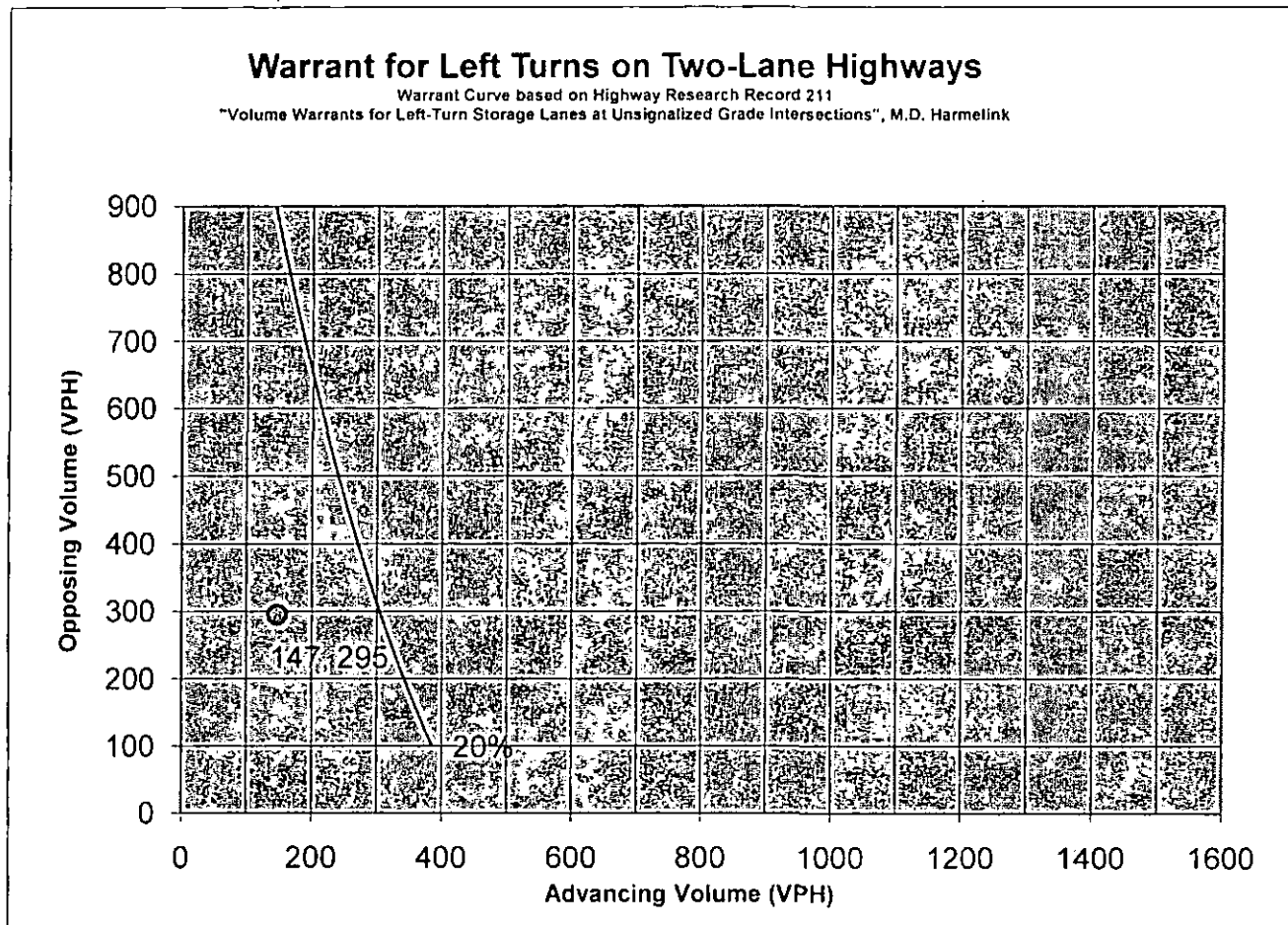
"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2017 Traffic Volumes with Development

PM Peak (Thursday)

Warrant Graph



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4358 • www.consultingtrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5
 "Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2012 Traffic Volumes with Development

Design Hour: PM Peak (Friday)

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted?
Advancing	Left	40	0%	40	No
	Thru	120	1%	121	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	138	1%	139	
	Right	223	0%	223	

Advancing Volumes: 161

Left Turns: 40

Opposing Volumes: 362

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



204 North George Street, Suite 110 • York, PA 17401-1108
 T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

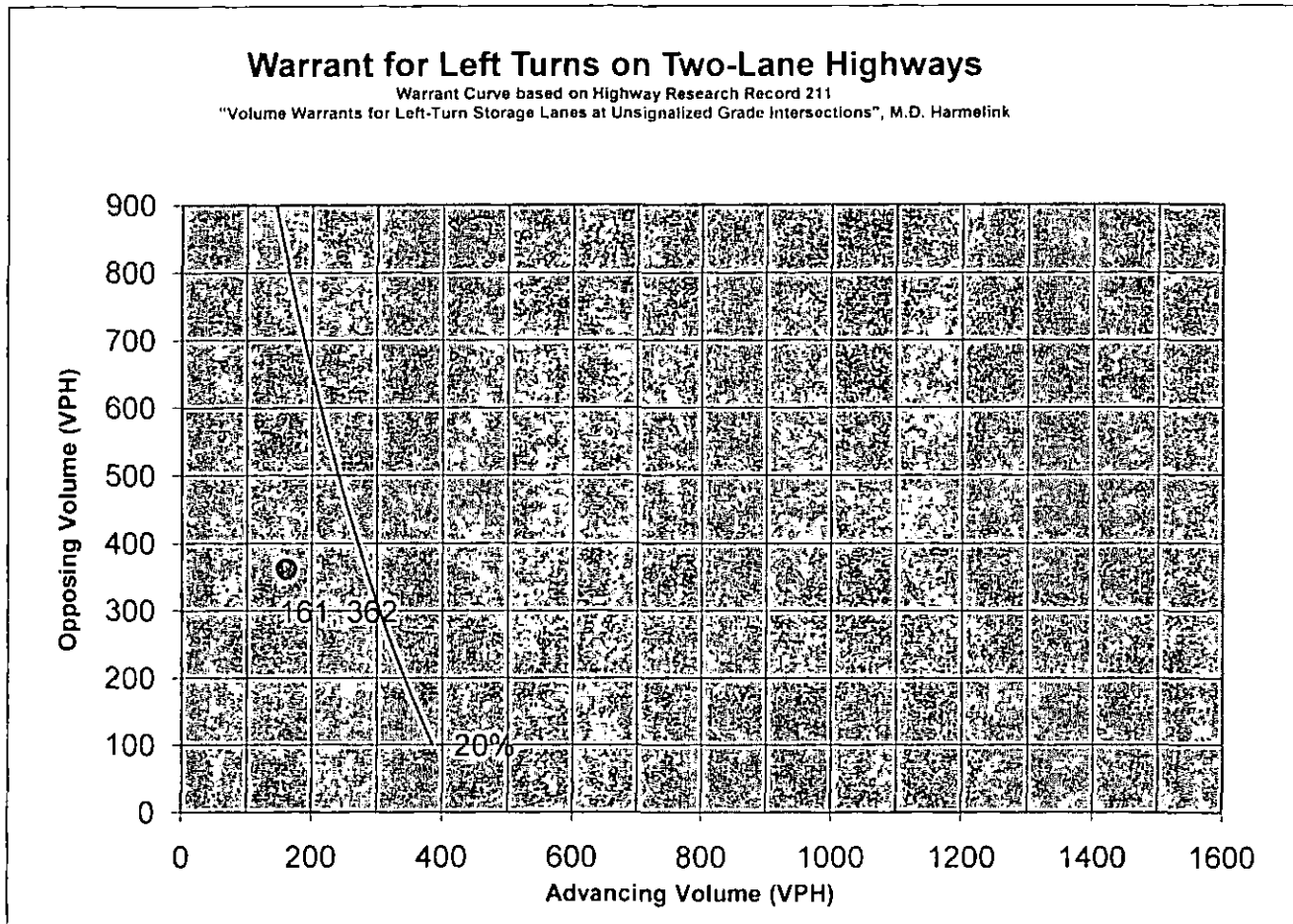
"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2012 Traffic Volumes with Development

PM Peak (Friday)

Warrant Graph



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2017 Traffic Volumes with Development

Design Hour: PM Peak (Friday)

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted ?
Advancing	Left	41	0%	41	No
	Thru	125	1%	126	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	144	1%	145	
	Right	225	0%	225	

Advancing Volumes: 167

Left Turns: 41

Opposing Volumes: 370

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2017 Traffic Volumes with Development

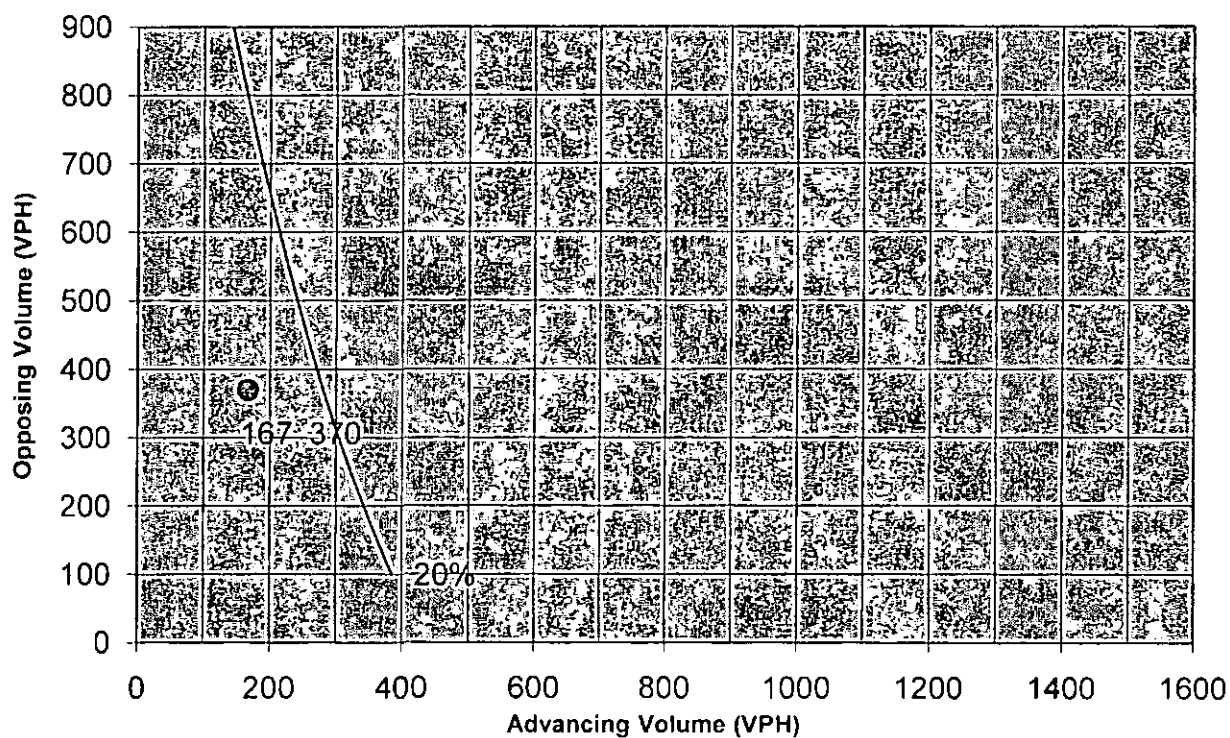
PM Peak (Friday)

Warrant Graph

Warrant for Left Turns on Two-Lane Highways

Warrant Curve based on Highway Research Record 211

"Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections", M.D. Harmelink



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted



214 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-1660 • F: (717) 846-4655 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2012 Traffic Volumes with Development

Design Hour: Saturday Peak

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted?
Advancing	Left	38	0%	38	No
	Thru	137	1%	138	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	101	1%	102	
	Right	236	0%	236	

Advancing Volumes: 176

Left Turns: 38

Opposing Volumes: 338

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2012 Traffic Volumes with Development

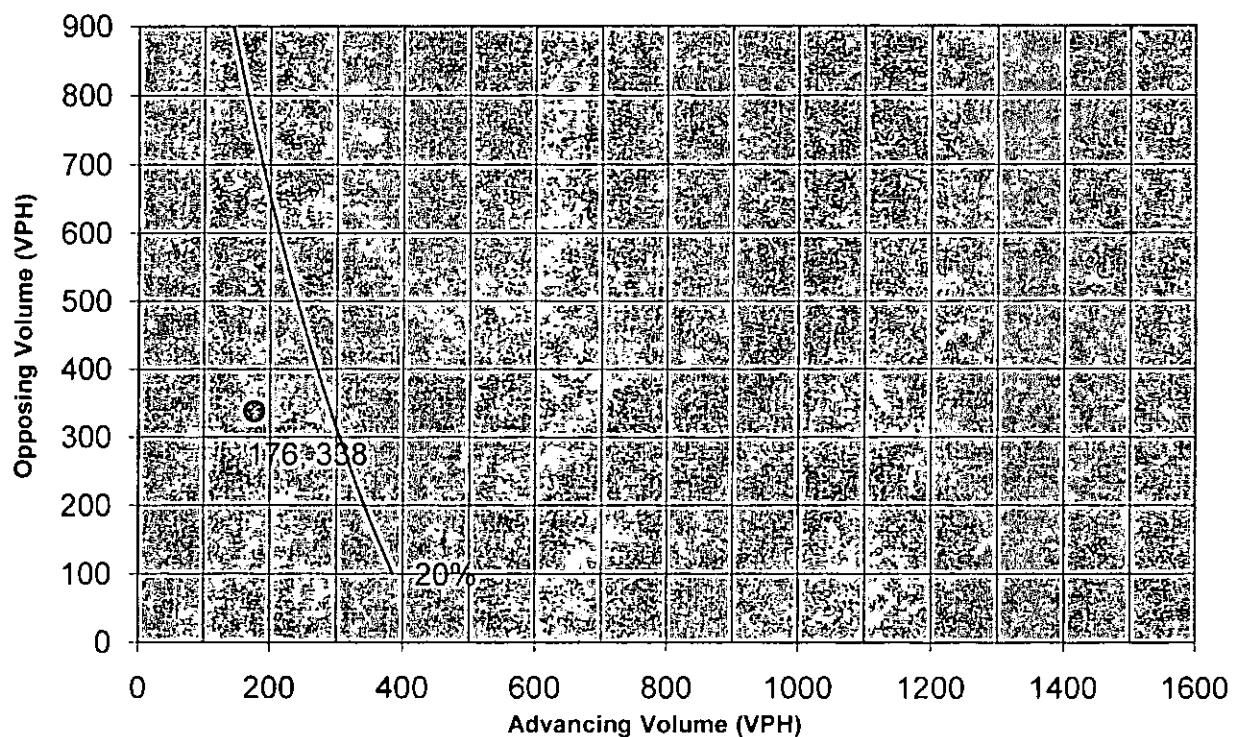
Saturday Peak

Warrant Graph

Warrant for Left Turns on Two-Lane Highways

Warrant Curve based on Highway Research Record 211

"Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections", M.D. Harmelink



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted



214 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4559 • F: (717) 846-4555 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

"Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.01

Location: Emmitsburg Road / Complex Driveway

Scenario: 2017 Traffic Volumes with Development

Design Hour: Saturday Peak

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

Terrain Type: Level

Signalized?: No

Volume & Warrant Details

Movement		Volume	Percent Trucks	PCEV	Left Turn Lane Warranted?
Advancing	Left	39	0%	39	No
	Thru	143	1%	144	
	Right	0	0%	0	
Opposing	Left	0	0%	0	
	Thru	105	1%	106	
	Right	237	0%	237	

Advancing Volumes: 183

Left Turns: 39

Opposing Volumes: 343

Left Turn Percentage: 20.00%

Storage Length Calculations

Type of Traffic Control	Speed (MPH)					
	25 - 35		40 - 45		50 - 60	
	Turn Demand Volume					
	High	Low*	High	Low*	High	Low*
Signalized	A	A	B or C **	B or C **	B or C **	B or C **
Unsignalized	A	A	C	B	B or C **	B

* Low is considered 10% or less of approach traffic volume

** Whichever is greater

Condition A	
Speed (MPH)	Storage Length
Any Speed	Length from Table 3
Condition B	
Speed (MPH)	Storage Length
40	75'
45	125'
50	175'
55	235'
60	295'
Condition C	
Speed (MPH)	Storage Length
40	61' + Additional length from Table 3
45	75' + Additional length from Table 3
50	93' + Additional length from Table 3
55	114' + Additional length from Table 3
60	131' + Additional length from Table 3



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

Guidelines for Left Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5

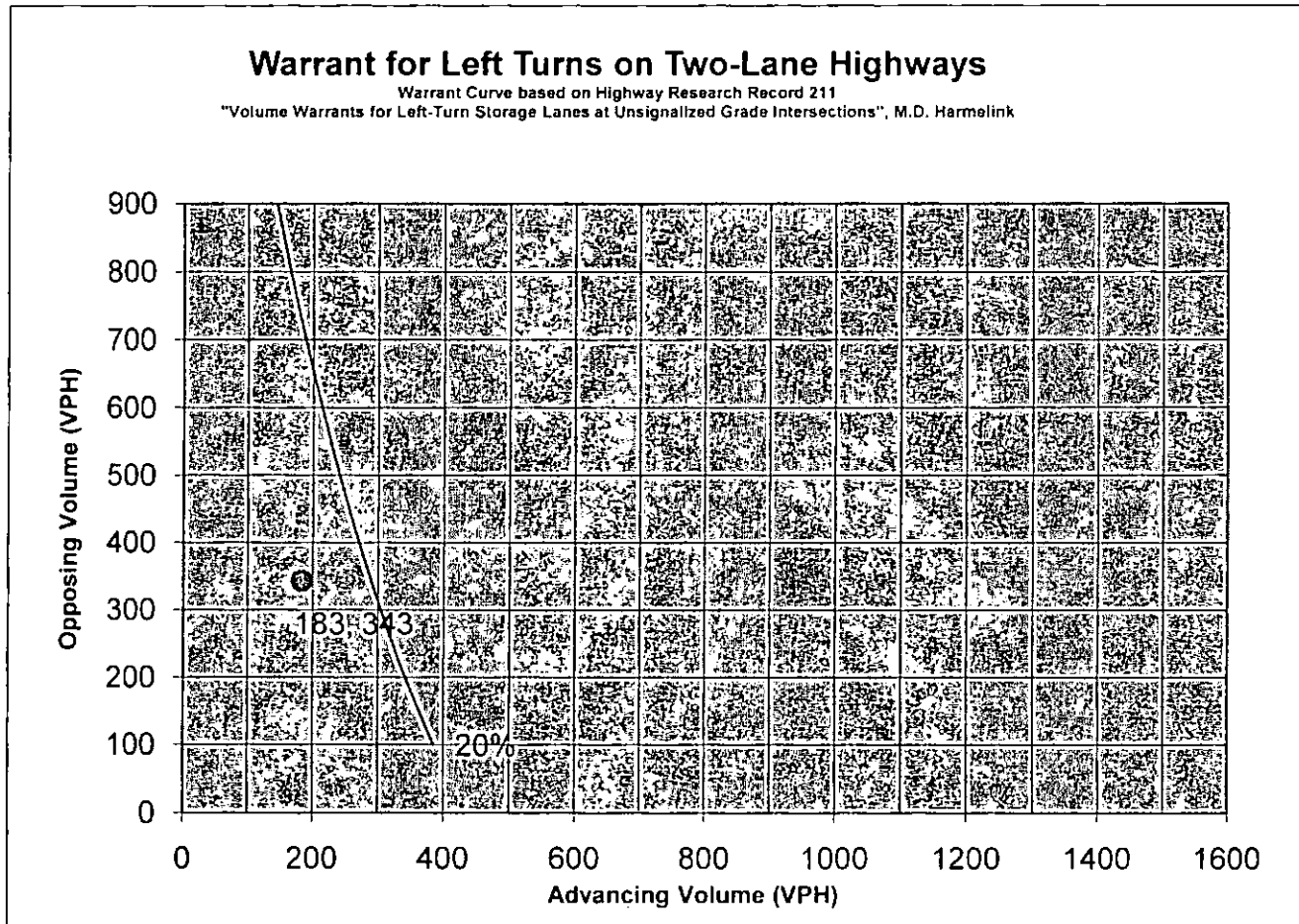
"Turn Lane Warrants" & "Turn Lane Storage Length"

Emmitsburg Road / Complex Driveway

2017 Traffic Volumes with Development

Saturday Peak

Warrant Graph



Storage Length Details

Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
No					

A Left Turn Lane is not Warranted



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4550 • F: (717) 846-4555 • www.consulttrg.com

Guidelines for Right Turn Treatments

Two-Lane Highway

Based on PennDOT Publication 46, Chapter 11.17.4 & 11.17.5
"Turn Lane Warrants" & "Turn Lane Storage Length"

General Information

Project Number: 388.1

Location: Emmitsburg Road / Complex Driveway

Performed By: DJT

Date: 3/16/2010

Speed Limit: 40 mph

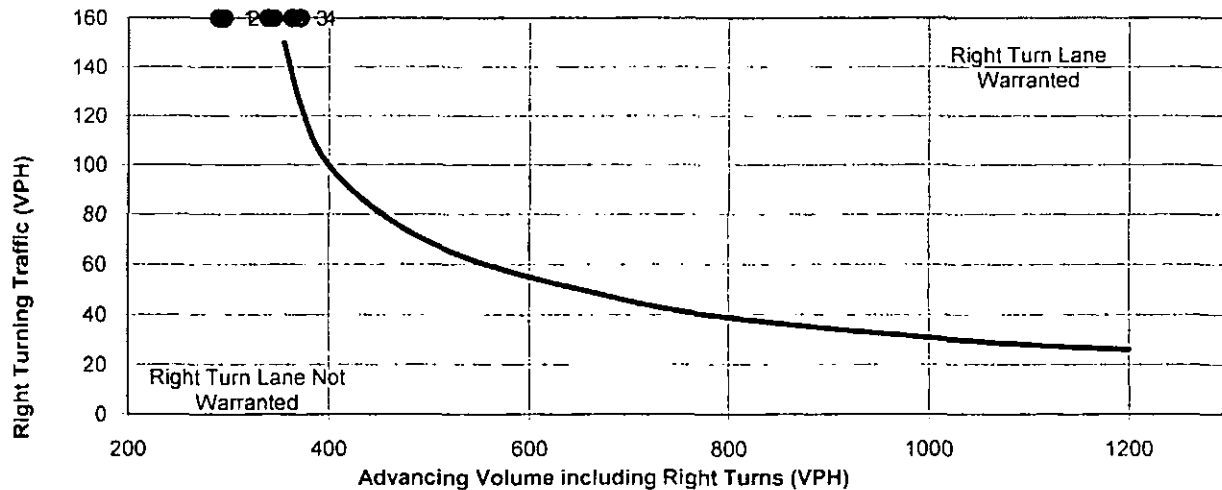
Terrain Type: Level

Signalized?: No

Analysis Details

	Scenario / Peak Hour	Approach PHV			% Trucks			PCEV Total Approach	PCEV Right Turns
		Left	Thru	Right	Left	Thru	Right		
1	2012 Traffic Volumes with Development - PM (Thurs)	0	115	174	0%	1%	1%	290	175
2	2017 Traffic Volumes with Development - PM (Thurs)	0	120	174	0%	1%	1%	295	175
3	2012 Traffic Volumes with Development - PM (Fri)	0	138	223	0%	1%	1%	363	224
4	2017 Traffic Volumes with Development - PM (Fri)	0	144	225	0%	1%	1%	371	226
5	2012 Traffic Volumes with Development - Sat	0	101	236	0%	1%	1%	339	237
6	2017 Traffic Volumes with Development - Sat	0	105	237	0%	1%	1%	344	238

Figure 9. Warrant for Right Turn Lanes on Two-Lane Roadways
(40 mph or lower speeds, unsignalized and signalized intersections)



Storage Length Calculations

Scenario	Turn Lane Warranted?	Condition A	Condition B	Condition C	Storage Length	Storage Length (Rounded to 25')
1	No					
2	No					
3	Yes	175	75	236	236	250
4	Yes	175	75	236	236	250
5	No					
6	No					

Results

A 250 Foot Right Turn Lane is Warranted



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com





204 N. George Street, Suite 110 • York, PA 17401-1108 • T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

MEETING NOTES

MEETING: Proposed Mason-Dixon Resort and Casino
Transportation Impact Study (TIS) Scoping Meeting
Cumberland Township, Adams County
TRG Project No. 388.01

LOCATION: PennDOT District 8-0, Franklin Room

DATE OF MEETING: April 29, 2010

TIME: 10:00 AM

ATTENDEES: Mazhar Malik, PennDOT 8-0
Eric Kinard, PennDOT 8-0
Charles Trapp, PennDOT 8-0
Florence Ford, Cumberland Township
Jodie Evans, McMahon Associates, Inc. (Township Traffic Engineer)
Dan Thornton, Transportation Resource Group, Inc (TRG)

DISTRIBUTION: All Attendees
David LeVan, Mason-Dixon Resorts, LLC
Bernard Yannetti, Hartman & Yannetti

PREPARED BY: Daniel J. Thornton, P.E., TRG, Inc.

TODAY'S DATE: May 5, 2010

This meeting was held to discuss the proposed Mason-Dixon Resorts and Casino Development located in Cumberland Township, Adams County. After introductions, the following is a summary of the discussions.

- Dan Thornton gave a brief overview of the proposed project. Currently on site is the All-Star Family Fun and Sports Complex located to the east of Emmitsburg Road (S.R.3001) in Cumberland Township, Adams County. Access to the existing building is provided by a driveway off of Emmitsburg Road (S.R.3001) to the south of Barlow Greenmount Road (S.R.3006). The proposed development is to renovate the existing building to provide a casino with 600 slots and 50 table games. The access will continue to be provided off of Emmitsburg Road.

- Dan Thornton explained that a traffic impact study has been completed for the proposed development. Based on the scoping letters that were reviewed by Cumberland Township and PennDOT, the following intersections were analyzed in the study:
 - Emmitsburg Road (S.R.3001)/Barlow Greenmount Road (S.R.3006)
 - Emmitsburg Road (S.R.3001)/Existing Resort Driveway
 - Emmitsburg Road (S.R.3001)/U.S. Route 15 Southbound Ramps (2)
 - Emmitsburg Road (S.R.3001)/U.S. Route 15 Northbound Ramps
- Flo Ford and Jodie Evans explained that the Township does have concerns that traffic oriented from the north along U.S. Route 15 will utilize the Taneytown Road interchange with U.S. Route 15 instead of continuing to the Emmitsburg Road interchange. PennDOT agreed that GPS units and map software may recommend motorists traveling to the site from the north to use the Taneytown Road interchange. Dan Thornton explained that while using the Taneytown interchange and Knight Road seems like it may be shorter and faster, in reality using the Emmitsburg Road interchange will be faster since Knight Road is not a straight shot but has many curves and lower speeds. The following action items were decided to address the Township's and PennDOT's concerns with site traffic using the Taneytown Road interchange:
 - Once the development is approved and ready for construction, the developer should contact the GPS companies to try to get the directions to state using the Emmitsburg Road interchange with U.S. Route 15.
 - Highway signage along U.S. Route 15 should be investigated to try to direct motorists to the Emmitsburg Road interchange with U.S. Route 15.
 - Traffic counts will be conducted at the following intersections in May or early June 2010:
 - Taneytown Road/U.S. Route 15 Northbound Ramps
 - Taneytown Road/U.S. Route 15 Southbound Ramps
 - Taneytown Road/Knight Road
 - Emmitsburg Road/Knight Road
 - Emmitsburg Road/U.S. Route 15 Northbound Ramps
 - Emmitsburg Road/U.S. Route 15 Southbound Ramps

These intersections will only be counted but not analyzed as part of the initial traffic impact study. The Emmitsburg Road interchange with U.S. Route 15 is being counted to compare the counts to the January and February counts that were already conducted.

- Traffic counts at the study intersections will need to be recounted as a follow-up study after the proposed casino has been constructed. The follow-up traffic counts will be conducted either in the May or September after the proposed development has been fully constructed. If the counts are significantly higher

(more than 10% difference) than expected in the approved traffic impact study, a new study will be required to determine the impacts and any improvements, if necessary.

- Eric Kinard asked about the analysis for the Emmitsburg Road interchange with U.S. Route 15 and if the interchange is in Cumberland Township. Flo stated that the interchange was outside the Township and was in Freedom Township. Eric required that Freedom Township be contacted regarding the proposed project. Dan Thornton stated that he will contact Freedom Township and will make sure that the Township receives a copy of the traffic impact study when it is submitted to the Department.
- Dan Thornton explained that as part of the analysis already completed, improvements are required at the Emmitsburg Road/Existing Resort Driveway intersection as part of the proposed development. A northbound right turn lane on Emmitsburg Road is not warranted but since the majority of the site traffic is anticipated from U.S. Route 15, the developer has agreed to install a northbound right turn lane. Also, a traffic signal is warranted in the opening year 2012 with the proposed development at this intersection during the Saturday peak hour. An HOP will be required for the proposed improvements. Mazhar Malik stated that he can include the follow-up study requirement in the condition statement and that he can keep the HOP open until the follow-up study has been completed and approved by the Township and PennDOT.

There being no further discussions, this segment of the meeting adjourned. If there are any additions or corrections to these meetings notes, please notify the writer within five days of your receipt of these meeting notes.



pennsylvania

DEPARTMENT OF TRANSPORTATION

www.dot.state.pa.us

March 19, 2010

RECEIVED

MAR 24 2010

TRG

Daniel J. Thornton, P. E.
Transportation Resource Group, Inc.
204 North George Street
Suite 110
York, PA 17401-1108

Adams Co.-Cumberland Twp.
Emmitsburg Rd. (SR 3001)/(Bus 15), Seg.: 0080
Mason-Dixon Resort & Casino
Scope of Study

Dear Mr. Thornton:

We have received your letter regarding the locations you have chosen to study for the proposed development at the subject location.

We concur with the locations you have chosen. However, you may need to modify the scope of traffic impact study to include all intersections where the proposed development is projected to generate 100 or more new trips during the peak hour. Scope must include the driveway(s) for possible turn lanes.

If you have any further questions regarding this matter, please contact Eric Kinard of the District Traffic Unit at 717-787-9237.

Very truly yours,

A handwritten signature in black ink, appearing to read "Tucker Ferguson", enclosed within a circular stamp or seal.

for: Tucker Ferguson, P. E.
District Executive

CHT/sab
(cht03191)

cc: Office of Planning & Zoning, Cumberland Township



204 N. George Street, Suite 110 • York, PA 17401-1108 • T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

February 17, 2010

Mr. Mazhar Malik
Permit Manager
PennDOT District 8-0
2140 Herr Street
Harrisburg, PA 17103

**RE: Proposed Mason Dixon Resort and Casino
Transportation Impact Study (TIS) Scoping Meeting
Cumberland Township, Adams County
TRG Project No. 388.01.H.01**

Dear Mr. Malik:

On behalf of Mason-Dixon Resorts, LLC, Transportation Resource Group, Inc. is requesting a TIS Scoping Meeting to discuss the proposed Mason Dixon Resort and Casino located in Cumberland Township, Adams County. The site is proposed at the All-Star Family Fun & Sports Complex located to the east of Emmittsburg Road (S.R.3001). TRG has prepared the TIS Scoping Meeting Application in accordance with the procedures outlined in PennDOT Strike-Off letter 470-09-4 dated February 12, 2009. We are requesting a meeting with PennDOT to discuss the proposed development and site access. Please let me know when the meeting is scheduled. If you have any questions, please feel free to give me a call.

Very truly yours,
Transportation Resource Group, Inc.

Daniel J. Thornton, P.E.
Senior Associate

DJT/vaw

cc: Richard Deen, P.E., PennDOT District 8-0 Traffic Unit
David M. LeVan, Mason-Dixon Resorts, LLC
Bernard A. Yannetti, Jr., Esquire, Hartman & Yannetti
Florence Ford, Township Manager, Cumberland Township
Timothy R. Knoebel, P.E., KPI Technology
Jodie Evans, P.E., PTOE, McMahon Associates, Inc.

TRANSPORTATION IMPACT STUDY (TIS) SCOPING MEETING APPLICATION

Scoping Meeting Date: To be determined

Applicant: Mason-Dixon Resorts, LLC

Applicant's Consultant: TRG - Daniel J. Thornton, P.E. (dthornton@consulttrg.com)

Applicant's Primary Contact: David LeVan (dlevan@comcast.net)

(Attach a list of meeting attendees along with phone numbers and email addresses)

(1) LOCATION OF PROPOSED DEVELOPMENT: *(Attach location map if available)*

PennDOT Engineering Dist.: 8 -- 0 County: Adams

Municipality: Cumberland Township

State Route(s) (SR): Emmitsburg Road (S.R.3001)

Segment(s): 0080 Offset(s): _____

Refer to the attached site location map.

(2) DESCRIPTION OF PROPOSED DEVELOPMENT: *(Attach site plan if available)*

Currently on site is the Eisenhower Inn and Conference Center and the All-Star Family Fun & Sports Complex. Access to the existing facilities is provided by an existing full movement driveway on Emmitsburg Road (S.R.3001) to the south of Barlow Greenmount Road. As part of the proposed development, the All-Star Family Fun building is proposed to be converted to a casino. The size of the building will not change but will be renovated to accommodate the casino's need. The casino is proposed to have 600 slots and 50 table games at this time. Access to the proposed casino will continue to be provided by the full movement driveway on Emmitsburg Road (S.R.3001). An aerial of the tract of land is attached for your reference.

Site access: Existing full movement access to Emmitsburg Road (S.R.3001).

Proposed Land Use: Casino with 600 slots and 50 table games.

Community Linkages access to neighboring properties, cross easements, pedestrian and transit accommodation): There are no proposed community linkages for this site.

The land use context for this area is Rural Community Arterial.

(3) DEVELOPMENT SCHEDULE AND STAGING:

Anticipated Opening Date: 2012
Full Buildout Date: 2012

Describe Proposed Development Schedule/Staging:

The proposed development will be built in one phase.

(4) TRIP GENERATION: *(Use most recent edition of Institute of Transportation Engineers (ITE) Trip Generation Manual unless PENNDOT approves another source. Non-ITE methods must be fully justified based on surveys of multiple sites of the same land use type and size.)*

Trip generation for the proposed development will be based on:

 ITE Trip Generation Manual.

 X Other independent surveys.

Attach justification for non-ITE methods.

The ITE article "Trip Generation Characteristics of Small to Medium Casinos" was used to determine the trip generation. Copies of the ITE article are attached.

List land development and trip generation information, as appropriate. If necessary, attach additional sheets to indicate additional land uses or development phases.

Estimated Trip Generation (Mason-Dixon Resort and Casino)										
Land Use	PM Peak Hour (Thursday)			PM Peak Hour (Friday)			Saturday Peak Hour			Average Weekday Daily Traffic
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total	
Casino (600 slots)	186	168	354	216	198	414	252	216	468	5,958

(5) ESTIMATED DAILY TRIP GENERATION/DRIVEWAY CLASSIFICATION:

(a) Estimated Daily Trip Generation of Proposed Development -- Assuming One Access Point and Full Buildout/Occupancy of Entire Tract: 5,958 trips/day

(b) Driveway Classification Based on Trip Generation and One Access Point:

Minimum Use: _____ Medium Volume: _____

Low Volume: _____ High Volume: X

(6) TRAFFIC IMPACT STUDY REQUIRED BASED ON PENNDOT GUIDELINES?

☐ No

☒ Yes, based on:

☒ 3,000 or more vehicle trips/day generated

☒ During any one-hour time period, 100 or more new (added) vehicle trips generated entering or 100 or more new (added) vehicle trips generated exiting development

☐ Other considerations as described below:

(7) TRAFFIC IMPACT ASSESMENT REQUIRED? ☐ No ☐ Yes

If a TIS is required, the following sections of this checklist will be discussed at the TIS Scoping Meeting. The applicant may provide preliminary information.

(8) TIS STUDY AREA: *(Describe; attach map and/or diagram)*

- Emmitsburg Road (S.R.3001)/Barlow Road (S.R.3006)
- Emmitsburg Road (S.R.3001)/Existing Driveway
- Emmitsburg Road (S.R.3001)/Cunningham Road (S.R.3008)
- Emmitsburg Road (S.R.3001)/US Route 15 Southbound Ramps
- Emmitsburg Road (S.R.3001)/US Route 15 Northbound Ramps

(9) STUDY AREA TYPE: Urban ☒ Rural ☐

(10) TIS ANALYSIS PERIODS AND TIMES: *(List periods and times. Normal analysis periods are existing conditions, 15 years in the future without development, and 15 years in the future with development. Normal analysis times for each period are the AM peak hour, the PM peak hour, and the peak hour of site-generated traffic.)*

Weekday Thursday PM Peak Hour between 3:00 and 6:00 PM

Weekday Friday PM Peak Hour between 4:00 and 7:00 PM

Weekend Saturday Peak Hour between 12:00 and 3:00 PM

(11) TRAFFIC ADJUSTMENT FACTORS:

(a) Seasonal Adjustment: *(Identify counts requiring adjustment and methodology)*

The counts will be seasonally adjusted using PennDOT Traffic Data Report.

(b) Annual Base Traffic Growth: 0.86 %/yr compounded Source
PennDOT

(c) Pass-By Trips: *(Attach justification where required)*

N/A

(d) Captured Trips for Multi-Use Sites: *(List % and manner of application. Attach justification where required.)*

N/A

(e) Other Adjustments:

(12) OTHER PROJECTS WITHIN STUDY AREA TO BE ADDED TO BASE TRAFFIC: *(Identify proposed developments with issued permits that need to be included.)*

To be determined by PennDOT and Cumberland Township.

(13) TRIP DISTRIBUTION AND ASSIGNMENT: *(Describe; explain/justify; attach diagram and related information.)*

Cordon Line Methodology & Marketing Analysis

(14) REQUIRED TRAFFIC COUNTS:

Turning movement counts will be conducted at the study intersections.

(15) CAPACITY/LOS ANALYSES:

Synchro 7.0 will be utilized to conduct the capacity analysis at the study intersections.

(16) ROADWAY IMPROVEMENTS/MODIFICATIONS BY OTHERS TO BE INCLUDED:
(Projects programmed for construction or other developments with issued permits.)

To be determined by PennDOT and Cumberland Township.

(17) OTHER NEEDED ANALYSES:

(a) Sight Distance Analyses: *(Required for all site access driveways; identify other locations.)*

Sight distance will be measured at the existing access on Emmitsburg Road
(S.R.3001).

(b) Signal Warrant Analysis: *(Identify locations)*

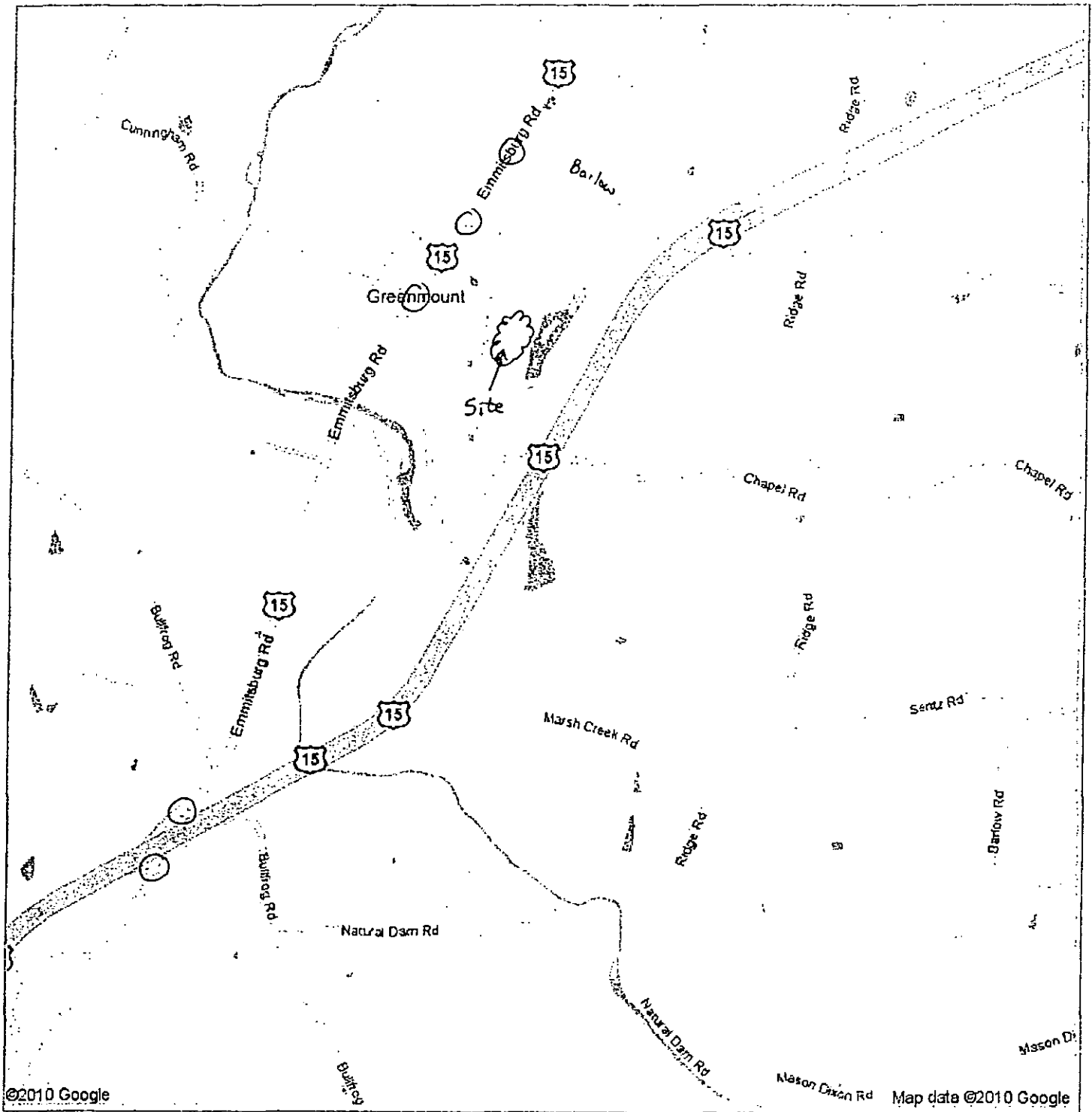
- Emmitsburg Road (S.R.3001)/Existing Access
- (c) Required Signal Phasing/Timing Modifications: *(Determine for all signalized intersections; specify methodology.)*
- N/A
- (d) Traffic Signal Corridor/Network Analyses: *(Identify locations/methodology)*
- N/A
- (e) Analyses of the Need for Turning Lanes: *(Identify locations/methodology)*
- Emmitsburg Road (S.R.3001)/Existing Access
- (f) Turning Lane Lengths: *(Identify methodology to be used)*
- Per PennDOT guidelines
- (g) Left Turn Signal Phasing Analyses: *(Identify locations/methodology)*
- N/A
- (h) Queuing Analyses: *(Identify locations and methodology)*
- N/A
- (i) Gap Studies: *(Identify locations and methodology)*
- N/A
- (j) Accident Analyses: *(Identify locations)*
- At the study intersections.
- (k) Weaving Analyses: *(Identify locations)*
- N/A
- (l) Other Required Studies: *(Specify location and methodology)*
- N/A

(18) ADDITIONAL COMMENTS OR RECOMMENDATIONS RELATIVE TO THE SCOPE OF THE TIS:

Google maps

Get Google Maps on your phone

Text the word "GMAPS" to 466453



○ - study intersections



204 N. George Street, Suite 110 • York, PA 17401-1108 • T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

January 27, 2010

Ms. Florence Ford, Manager
Cumberland Township
1370 Fairfield Road
Gettysburg, PA 17325

**Re: Mason-Dixon Resorts, LLC
Mason-Dixon Resort and Casino
Traffic Impact Study Scoping Letter
Cumberland Township, Adams County
TRG Project No. 388.01**

Dear Ms. Ford:

This letter summarizes the proposed traffic impact study scope for the proposed Mason-Dixon Resort and Casino located to the east of Emmitsburg Road (S.R.3001) in Cumberland Township, Adams County. Currently on site is the Eisenhower Inn and Conference Center and the All-Star Family Fun & Sports Complex. Access to the existing facilities is provided by an existing full movement driveway on Emmitsburg Road (S.R.3001) to the south of Barlow Greenmount Road.

As part of the proposed development, the All-Star Family Fun building is proposed to be converted to a casino. The size of the building will not change but will be renovated to accommodate the casino's need. The casino is proposed to have 600 slots and 50 table games at this time. Access to the proposed casino will continue to be provided by the full movement driveway on Emmitsburg Road (S.R.3001). An aerial of the tract of land is attached for your reference.

As part of the traffic impact study, we are proposing the following study scope:

Study Intersections

- Emmitsburg Road (S.R.3001)/Existing Driveway

Trip Generation

The trip generation for the site was determined based on an ITE article "Trip Generation Characteristics of Small to Medium Sized Casinos". A copy of the ITE article is attached. The article describes the trip generation for five small to medium casinos that had slots and tables. The casinos in the article had more slots than the proposed Mason-Dixon Resorts and Casino will have but the total number of tables are comparative. Therefore, the trip generation rates

included in the article will be utilized to determine the anticipated traffic for the proposed casino. Based on the information in the article, the Adjacent Street Peak Hour Trip Generation table will be utilized for the PM peak hour (Thursday) and the Facility Peak Hour Trip Generation table will be utilized for the PM peak hour (Friday) and for the Saturday peak hour. A table is attached that summarizes the anticipated trip generation.

Due to the existing Eisenhower Inn and Conference Center located on the site as well, an internal capture will be assumed from the hotel to the proposed casino. While ITE Trip Generation Handbook does not have an internal capture percentage between lodging and recreational, it was assumed that 2% of the trips to/from the proposed casino will be from the existing Eisenhower Hotel and will never leave the site. The attached trip generation table shows the proposed internal capture for the proposed casino.

Trip Distribution

Trip distribution will be determined based on the existing turning movement counts (TMC) conducted at the site access intersection. Copies of the existing traffic counts are attached. The anticipated trip distribution will be assumed as follows:

- 55% oriented to/from the north on Emmitsburg Road (S.R.3001)
- 45% oriented to/from the south on Emmitsburg Road (S.R.3001)

A sketch is attached that shows the anticipated trip distribution and assignment for the proposed casino.

Study Time Periods

The study periods for analysis are proposed as follows:

- Weekday Thursday PM Peak Hour 3:00 – 6:00 PM
- Weekday Friday PM Peak Hour 4:00 – 7:00 PM
- Saturday Peak Hour 12:00 – 3:00 PM

The traffic counts were conducted in January 2010 and will be seasonally factored using guidelines from PennDOT Traffic Data. Copies of the seasonal factors are attached. Automatic traffic recorder (ATR) counts will also be conducted on Emmitsburg Road (S.R.3001) and the existing driveway.

Analysis Scenarios

The following analysis scenarios are proposed based on an opening year of 2011 and a 5 year design period:

- Existing traffic volumes
- 2011 traffic volumes without development
- 2011 traffic volumes with development
- 2016 traffic volumes without development
- 2016 traffic volumes with development

Ms. Florence Ford
January 27, 2010
Page 3

The background growth rate factor will be determined based on PennDOT's Growth Factors for July 2009 to July 2010. For this development, the growth rate factor is 0.86% per year.

Please review the attached information and respond in writing with your required scope of work. We are also requesting any developments and/or committed roadway improvements within our study area that the Township will require to be included in the Traffic Impact Analysis for the proposed development.

If you have any questions, please feel free to give me a call.

Very truly yours,
Transportation Resource Group, Inc.



Daniel J. Thornton, P.E.
Senior Associate

DJT/vaw
Attachments

cc: David LeVan, Mason-Dixon Resorts, LLC
Bernard A. Yannetti, Jr., Esquire, Hartman & Yannetti
Timothy R. Knoebel, P.E., KPI Technology
Jodie Evans, P.E., PTOE, McMahon Associates, Inc.



Traffic

Capitol

Ruler's Edge

Lemans

Incline Cutoff

Western Inn

Barlow Greenmount Rd

Emmit'sburg Rd

15

Eisenhower Hotel & Conference

15

Emmit'sburg Rd

Boyd's Bear County

Emmit'sburg Rd

15

Proposed Casino

Natural Resources

Trip Generation Characteristics of Small to Medium Sized Casinos

Michael Trueblood, Tara Gude

OVERVIEW

This paper focuses on trip generation for small to medium sized casinos that are not part of a cluster of casinos. The data collection for this paper included three casinos located in Council Bluffs, Iowa. Two of the casinos are riverboat casinos and are located along the Missouri River, while the other casino includes an existing dog racetrack that later added slot machines.

In addition to the casinos located in Council Bluffs, the calculated trip generation rates were compared to rates included in a March 1998 ITE Journal article entitled *Gaming Casino Traffic*. The article calculated trip generation rates for two casinos in the St. Louis metropolitan area, the Casino Queen and the St. Charles Casino.

There is not an overwhelming amount of trip generation information available for casinos located outside of the typical Las Vegas or Atlantic City stereotype. The trip generation characteristics of casinos found in large clusters, like those in Las Vegas for example, are not similar to the casinos that will be covered in this article. For comparison purposes the MGM Grand Casino in Las Vegas has over 5,000 hotel rooms with over 3,500 slot machines, while the Treasure Island Casino has over 2,900 hotel rooms with over 2,000 slot machines. The trip generation characteristics of these casinos are quite different than the five covered in this paper due to their immense size and popularity. Another reason these casinos have different trip generation characteristics is because they are accessible by foot. In Las Vegas people tend to walk to and from the casinos or drive to one and then walk to several others throughout the course of a day.

It should be noted that each state has different rules and regulations that govern the actual type of establishment that can be used for gambling. Recent regulations have changed or have been modified in order to allow gambling facilities to be established beyond the typical riverboat casinos. Examples of these casinos are those operated by Indian Tribes. There are several casinos operated by Indian Tribes across the country. These casinos range in size, but they are good examples of the types of casinos this paper addresses.

LOCATION OF CASINOS

This section will provide a brief overview of the location of the three Council Bluffs casinos and the two casinos located in the St. Louis metropolitan area. The casino locations are shown in Figure 1. The three casinos in Council Bluffs, Iowa are located near the Missouri River in the Omaha metropolitan area. The Ameristar Casino and Harvey's Casino are located along the river within one mile of each other in the northwest quadrant of the I-29/I-80 interchange. Bluffs Run Casino is located about two miles east of these casinos along I-80. For comparison purposes to other casino locations, the 1998 average daily traffic (ADT) along I-29 was 40,500 vehicles, while the 1998 ADT along I-80 was 67,400 vehicles. The estimated 1999 population is 1,040,000 people within a 50-mile radius of the casinos.

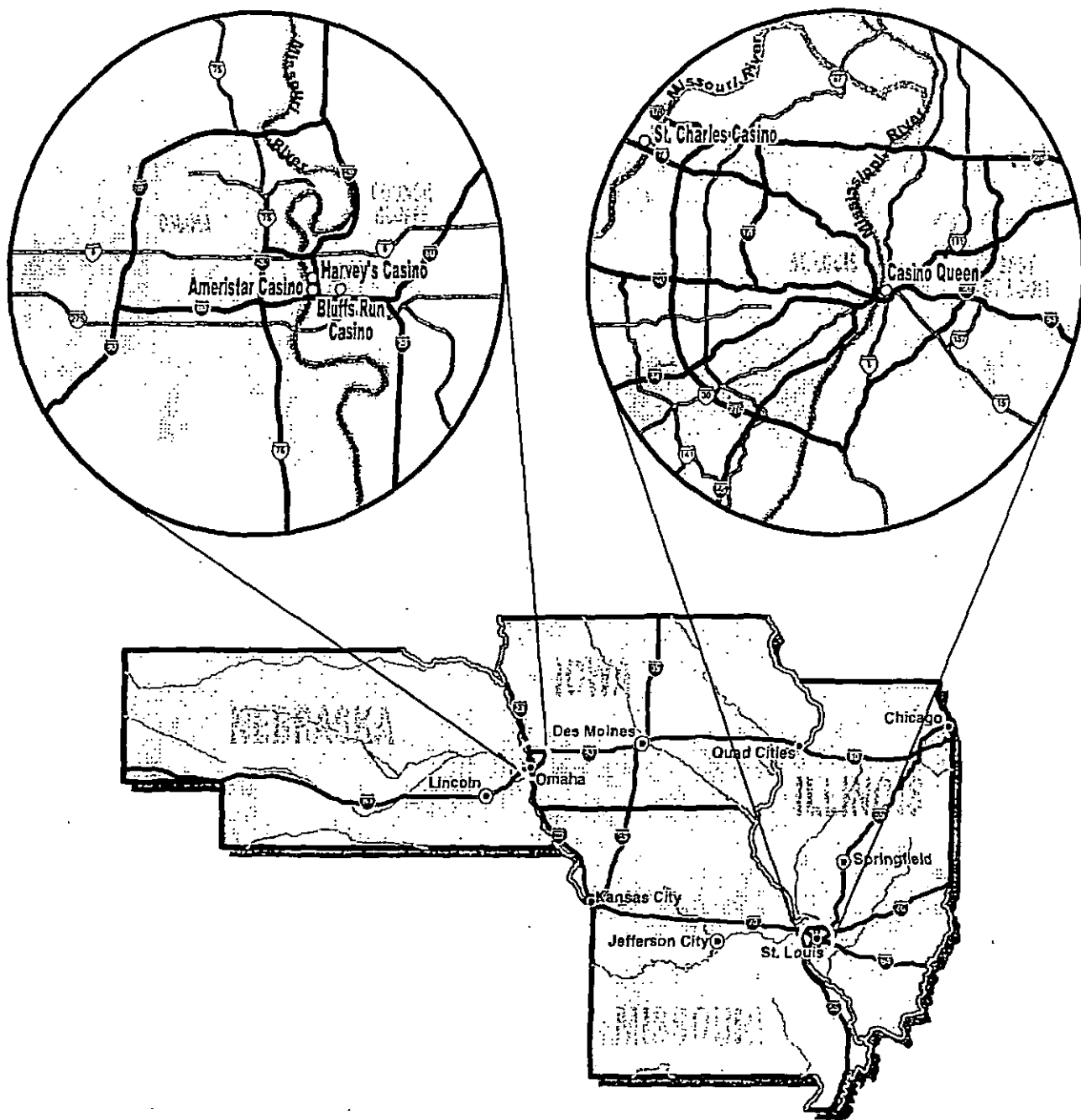


Figure 1 – Casino Location Map

The two St. Louis area casinos are also depicted in Figure 1. The St. Charles Casino is located along the Missouri River immediately north of I-70/Missouri River junction and about five miles to the west of I-270/I-70 junction in the City of St. Charles. The 1998 ADT along I-70 was 188,000 vehicles. The Casino Queen is located along the Mississippi River immediately east of the Gateway Arch and immediately north of the I-70/I-64/I-55 junction in the City of East St. Louis, Illinois. The ADT of these three interstates are 117,300 vehicles. The estimated 1999 population is 2,637,000 people within a 50-mile radius of the St. Louis area casinos.

GAMING REVENUES OF STUDY CASINOS

This section discusses the gaming revenues of the tri-state region where the five casinos presented in this paper are located. Between the years 1994-1999, St. Charles Casino had the second highest attendance of the eleven riverboat casinos within the state of Missouri. During the fiscal year 2000 the eleven riverboat casinos made over \$1.0 billion in adjusted gross revenues (AGRs). In Illinois, the nine riverboat casinos made over \$1.66 billion AGRs in 2000, with the Casino Queen ranked fifth out of the nine riverboats. In Iowa, Harvey's Casino and Ameristar Casino ranked one and two of out ten casinos in AGRs, respectively. The ten casinos in Iowa combined for over \$575 million in AGRs. Casinos within the State of Iowa that also have pari-mutuel wagering are accounted for separately in terms of their AGRs. Bluffs Run Casino was ranked two out of three casinos in AGRs. The three racetrack casinos, as they are called in Iowa, combined for over \$300 million in AGRs in 2000.

TRIP GENERATION CHARACTERISTICS OF STUDY CASINOS

Most of the available information concerning trip generation of casinos is related to large casinos or clusters of several casinos, such as those in Las Vegas. In order to determine the trip generation characteristics of small to medium sized casinos, HDR collected traffic information at three casinos in Council Bluffs, Iowa. Once the trip generation rates were computed, they were compared to trip generation rates of two St. Louis area casinos documented in a March 1998 issue of the ITE Journal.

Table 1 documents the five casinos' characteristics. It should be noted that the information for the Council Bluffs casinos is for the year 2000, while the information for the St. Louis casinos was collected in 1998.

Table 1 – General Casino Information

Amenities	Council Bluffs, Iowa			St. Louis Metro Area	
	Harvey's	Ameristar	Bluffs Run	St. Charles	Casino Queen
Slots	1169	1446	1479	1847	1020
Total Tables	53	51	0	90	51
Gaming sq. ft.	28,250	38,000	34,280	50,000	27,500
Hotel Rooms	251	356	0	<i>Not Applicable</i>	<i>Not Applicable</i>
Employees	1257	1329	1046	<i>Not Available</i>	1079
Pari-mutuel Wagering	No	No	Yes	No	No
Convention Center (seats)	900	170	No	<i>Not Available</i>	<i>Not Available</i>

The data collection for the Council Bluffs casinos was conducted during the following times:

- Ameristar – Saturday, July 15th to Tuesday, July 25th, 2000.
- Harvey's – Thursday, July 20th to Sunday, July 30th, 2000.
- Bluffs Run – Wednesday, July 19th to Saturday, July 29th and Saturday August 19th to Monday August 28th, 2000.

Automatic tube recorders were placed at all entrances and exits to the casinos. Data was collected in fifteen-minute intervals, 24-hours a day for each of the casinos. All five casinos operated on a 24-hour basis. As will be discussed later, the hourly information was unique when compared to other land uses. The following sections provide detailed information on the trip generation characteristics of the three Council Bluffs casinos. These rates were compared to the two St. Louis casinos and since the rates for all five casinos were similar, an average trip generation rate was computed.

Peak Hour Trip Generation Rates

A trip generation rate was calculated based on the number of slot machines that were located at each casino. Generation rates were calculated for both weekdays and weekends. Weekday trip generation rates were calculated for both the peak of facility and peak of adjacent street traffic. Traffic studies for new developments generally analyze the weekday peak hour of adjacent street traffic. However, several types of developments generate higher traffic levels during times other than the adjacent street traffic peak hour. Data from the casinos indicate that their peak trip generation rates are different than the peak hour of adjacent street traffic. Table 2 depicts the average PM peak hour trip generation rates of the five casinos for the peak hour of facility, while Table 3 depicts the average PM peak hour trip generation rate for the adjacent street traffic. The PM peak hour was chosen for purposes of calculating trip generation rates because they were generally higher than the AM peak hour. Tables A1, A2, and A3 located at the end of the paper document the three Iowa casinos daily raw peak hour and time of day data.

Table 2 – Facility Peak Hour Trip Generation

	PM Peak Hour										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	502	380	423	477	537	491	725	625	348	336	507	462
Saturday/Sunday	482	375	624	471	553	579	850	750	Not Available		627	544
	PM Peak Hour Per Slot										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips Per Slot	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	0.43	0.33	0.29	0.33	0.36	0.33	0.39	0.34	0.34	0.33	0.36	0.33
Saturday/Sunday	0.41	0.32	0.43	0.33	0.37	0.39	0.46	0.41	Not Available		0.42	0.36

Note: St. Charles weekday rate is for Friday only.

Table 3 – Adjacent Street Peak Hour Trip Generation

	PM Peak Hour										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	453	340	427	378	442	373	475	600	Not Available		449	423
Saturday/Sunday	423	334	491	413	490	467	Not Available	Not Available	Not Available		468	404
	PM Peak Hour Per Slot										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips Per Slot	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	0.39	0.29	0.29	0.26	0.30	0.25	0.26	0.32	Not Available		0.31	0.28
Saturday/Sunday	0.36	0.29	0.34	0.29	0.33	0.32	Not Available	Not Available	Not Available		0.34	0.30

Note: St. Charles weekday rate is for Friday only.

The PM peak hour trip generation rates were similar for each of the three Council Bluffs casinos. These rates were found to be comparable to the two St. Louis area casinos' trip generation rates. As shown above in Table 3, there is a correlation between the number of slot machines and the traffic generated by the casinos. For example, the two St. Louis area casinos have a difference in the number of trips generated by the facility. However when the trip generation rates were developed on a per slot machine basis, the rates are quite similar. Even though the St. Charles Casino has 800 slot machines more than the Casino Queen, their trip generation rates are comparable.

HDR's analysis of the five casinos in St. Louis and Council Bluffs found that their average weekday PM peak hour of adjacent street traffic trip generation rate was 0.59 trips per slot machine, while the average weekend PM peak hour trip generation rate was 0.64 trips per slot machine. These rates were close to the weekday and weekend PM peak hour of generator, which were 0.69 trips and 0.78 trips per slot machine, respectively.

The original trip generation rates calculated for the St. Louis area casinos were based on gaming positions. For purposes of this paper the rates provided in the March ITE Journal article were converted to trips per slot machine. This was done in order to directly compare the Council Bluffs and St. Louis trip generation rates. Gaming positions are calculated based on each type of game and are a percentage of the number of slot machines. Thus, calculating the number of gaming positions can get cumbersome. The other reason slot machines were used to calculate trip generation rates was because Bluffs Run Casino does not have table games.

Daily Trip Generation Rates

Table 4 shows the ADTs that were collected for the three Iowa casinos. An average daily trip rate was developed based on information from the three Iowa casinos and from the St. Charles Casino. Not enough information was available in order to include the Casino Queen in these calculations. Table 5 shows the weekday and weekend daily trip rates for each of the four casinos in addition to an average daily trip rate.

Table 4 – Average Daily Traffic (ADT)

Day	Harvey's Daily Volume			Ameristar Daily Volume			Bluffs Run Daily Volume		
	Inbound Volume	Outbound Volume	ADT	Inbound Volume	Outbound Volume	ADT	Inbound Volume	Outbound Volume	ADT
Sunday	7,038	6,749	13,787	7,438	8,175	15,613	8,871	8,887	17,758
Monday	5,402	4,745	10,147	5,378	5,394	10,771	6,665	6,741	13,406
Tuesday	9,334	8,496	17,830	6,903	6,761	13,663	7,702	7,180	14,882
Wednesday	6,401	5,221	11,622	5,823	5,730	11,553	7,499	6,827	14,326
Thursday	6,944	5,462	12,406	5,845	5,703	11,548	8,494	7,867	16,361
Friday	8,230	5,938	14,168	8,043	7,460	15,503	9,211	8,441	17,652
Saturday	8,075	7,025	15,100	8,311	8,129	16,440	9,957	9,392	19,349

Table 5 – Average Daily Traffic Rates

	ADT				ADT per slot				Average ADT per slot
	Harvey's	Ameristar	Bluffs Run	St. Charles	Harvey's	Ameristar	Bluffs Run	St. Charles	
Monday - Friday	13,249	12,496	15,325	17,362	11.33	8.64	10.36	9.40	9.93
Saturday/Sunday	14,443	16,026	18,554	19,959	12.36	11.08	12.54	10.81	11.70

Note: St. Charles weekday rate is for Friday only.

The ADT was higher on weekend days compared to weekdays. As shown in Table 4 there was more than a 50% increase in the ADT on weekends at some of the casinos. Another interesting factor that made relatively large increases in ADT was the special promotions that the casinos offer. For example, Harvey's Casino had double points for slot club members on Tuesdays, which generated more traffic than a typical weekend day. Double points allow slot club members to earn extra points that can be redeemed for cash.

Another finding of interest was the amount of traffic that occurs during the late night hours. It was assumed that this was related to the fact that all five casinos evaluated in this paper were located within a metropolitan area and relatively close to an interstate. Table 6 documents the time variation of trips at the three Council Bluffs casinos and the St. Charles Casino. Again, data was not available for Casino Queen.

Table 6 – Casino Related Time Variations of Trips

	Percentage of Traffic during each time period									
	Harvey's		Ameristar		Bluffs Run		St. Charles		Average	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
9 AM - 9 PM	64.6	58.4	69.0	61.9	66.1	59.5	65.7	69.5	66.3	62.3
9 PM - 9 AM	35.4	41.6	31.0	38.1	33.9	40.5	34.3	30.5	33.6	37.7
12 AM - 6 AM	10.9	17.9	9.2	16.2	10.9	17.4	13.8	9.0	11.2	15.1
6 AM - 12 PM	21.0	19.6	20.7	17.3	23.1	20.8	15.8	19.0	20.1	19.2
12 PM - 6 PM	34.3	31.2	37.9	32.3	34.7	31.7	34.6	33.6	35.4	32.2
6 PM - 12 AM	33.8	31.3	32.3	34.1	31.3	30.1	35.8	38.4	33.3	33.5

Generally, most land uses do not operate on a 24-hour basis. As a result, roadways located near these casinos tend to have more traffic on them during the late night hours. The daily trip information is important because it captures some of the impacts related to off-peak traffic levels. This could lead to potential concerns of nearby residents or business owners. If the location of a potential casino was proposed near a neighborhood, the future casino could cause lighting, noise, or other environmental concerns. Our data shows some justification to these concerns over late-night traffic. Typically between the hours of 12:00 AM and 6:00 AM most land uses are not in operation and thus do not generate trips. These four casinos, on the other hand, averaged over 15% of their daily trips during these same hours. This could lead to potential complaints by nearby residents or businesses.

SUMMARY

This paper included the trip generation rates of three Iowa casinos and compared their rates to that of two St. Louis casinos included in a March 1998 ITE Journal article. In general, the five casinos had comparable trip generation rates for both weekdays and weekends. These rates could be used when determining the viability of a proposed casino or the expansion of an existing casino. As always, data collected at or near the actual casino site should be used, but if this is not possible, these rates could provide for a relative comparison of whether the nearby roadways could handle the increase in traffic due to the casino.

HDR's analysis of the five casinos found that their average weekday PM peak hour of adjacent street traffic trip generation rate was 0.59 trips per slot machine, while the average weekend PM peak hour trip generation rate was 0.64 trips per slot machine. These rates were close to the weekday and weekend PM peak hour of generator, which were 0.69 trips and 0.78 trips per slot machine, respectively. The average weekday ADT was 9.93 trips per slot, while the weekend average ADT was 11.70 trips per slot.

It should also be noted that these casinos could be considered isolated in terms of walking from one to another. The generation rates of casinos that are found in clusters (Las Vegas) have different characteristics than the casinos studied in this paper. This can be related to the large number and size of casinos located within the clusters and the fact that they are generally located very close to each other. Another important piece of information that should be reviewed is a market analysis. A market analysis could give an estimate of the daily admissions expected at the casino. This could give an indication if these rates are applicable to the proposed casino. As with all land uses, variations in trip generation rates will exist, but knowing what the potential traffic impact could be is better than not having any comparative information.

Authors Information

Michael T. Trueblood, P.E., P.T.O.E
Traffic Engineer
HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114
(402) 399-1277
Email: mtrueblo@hdrinc.com

Tara Gude, E.I.
 Traffic Engineer
 HDR Engineering, Inc.
 8404 Indian Hills Drive
 Omaha, NE 68114
 (402) 399-1322
 Email: tgude@hdrinc.com

REFERENCES

1. Box, Paul C., Bunte, William. *Gaming Casino Traffic*. ITE Journal, March 1998.
2. State of Iowa Website, *Iowa Racing and Gaming Commission, Riverboat Revenue Report and Track Gaming Report* for YTD 7/01/99 thru 06/30/00, www3.state.ia.us.
3. Illinois Gaming Board Website, *Monthly Riverboat Casino Report* (calendar year-to-date through December 2000), www.igb.state.il.us.
4. Gaming Magazine Website, *Missouri Gaming Revenue Hit \$1 Billion Last Year*, www.gamingmagazine.com
5. Missouri Riverboat Gaming Association Website, *Analysis of Riverboat Gaming, Fiscal Year 1994-1999 Admissions*. www.mrga.org.
6. MGM Grand Casino Website, www.mgmgrand.com.
7. Treasure Island Casino Website, www.treasureisland.com.

Table A1 – Harvey's Peak Hour Raw Data

Day	Date	AM Peak Hour			PM Peak Hour		
		Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Thursday	7/20/00	11:00	358	209	6:00	458	317
Friday	7/21/00	10:45	323	252	5:00	548	387
Saturday	7/22/00	10:00	285	273	5:30	591	380
Sunday	7/23/00	11:00	433	265	3:30	409	462
Monday	7/24/00	10:45	280	208	4:30	347	279
Tuesday	7/25/00	11:00	562	469	6:00	715	606
Wednesday	7/26/00	10:45	320	203	5:00	440	352
Thursday	7/27/00	11:00	362	263	6:00	493	319
Friday	7/28/00	10:45	412	179	5:30	512	403
Saturday	7/29/00	11:00	304	256	5:00	518	317
Sunday	7/30/00	11:00	345	271	3:15	410	342

Table A2 – Ameristar Peak Hour Raw Data

Day	Date	AM Peak Hour			PM Peak Hour		
		Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Saturday	7/15/00	10:30	363	240	5:30	596	420
Sunday	7/16/00	11:00	379	388	6:00	609	543
Monday	7/17/00	10:45	248	282	3:15	314	435
Tuesday	7/18/00	11:00	430	287	3:00	463	637
Wednesday	7/19/00	10:45	340	230	5:30	429	334
Thursday	7/20/00	10:45	356	228	3:00	349	471
Friday	7/21/00	11:00	364	283	5:45	662	441
Saturday	7/22/00	11:00	370	265	5:45	700	461
Sunday	7/23/00	11:00	409	351	5:45	592	461
Monday	7/24/00	10:45	299	289	3:15	319	462
Tuesday	7/25/00	11:00	458	343	3:00	427	557

Table A3 – Bluffs Run Peak Hour Raw Data

Day	AM Peak Hour			PM Peak Hour		
	Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Monday	11:00	348	420	15:00	443	416
Tuesday	10:45	436	393	15:00	549	513
Wednesday	11:00	417	310	15:00	542	474
Thursday	10:45	425	370	15:30	571	507
Friday	11:00	406	379	15:30	580	544
Saturday	11:00	478	361	16:00	486	635
Sunday	10:15	423	378	15:00	620	523

Table 1 Estimated Trip Generation (Mason-Dixon Resort and Casino)											
Land Use (Code)	Type	PM Peak Hour (Thursday)			PM Peak Hour (Friday)			Saturday Peak Hour			Average Weekday Daily Traffic
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total	
Casino (600 slots)	New	182	165	347	212	194	406	247	212	459	5958
	Internalization 2%	4	3	7	4	4	8	5	4	9	
	Total	186	168	354	216	198	414	252	216	468	



Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

Location: Emmitsburg Rd / Eisenhower Drwy

Municipality: Cumberland Twp.

Day: Thursday

Counter: Steve

File Name : 3880111

Site Code : 03880101

Start Date : 1/14/2010

Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001)

Eisenhower / Allstar Driveway

Emmitsburg Road (S.R.3001)

Southbound

Westbound

Northbound

Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
15:00	19	2	0	4	1	15	41
15:15	21	1	3	1	2	20	48
15:30	16	3	6	2	0	23	50
15:45	23	1	11	5	1	16	57
Total	79	7	20	12	4	74	196
16:00	19	3	2	3	4	17	48
16:15	11	4	2	4	1	20	42
16:30	17	3	1	1	4	15	41
16:45	27	2	1	2	0	29	61
Total	74	12	6	10	9	81	192
17:00	21	3	1	0	1	25	51
17:15	23	1	1	2	1	23	51
17:30	24	3	2	1	4	21	55
17:45	14	2	0	1	10	19	46
Total	82	9	4	4	16	88	203
Grand Total	235	28	30	26	29	243	591
Apprch %	89.4	10.6	53.6	46.4	10.7	89.3	
Total %	39.8	4.7	5.1	4.4	4.9	41.1	
Passenger Vehicles	233	28	30	26	29	241	587
% Passenger Vehicles	99.1	100	100	100	100	99.2	99.3
Trucks, Buses	2	0	0	0	0	2	4
% Trucks, Buses	0.9	0	0	0	0	0.8	0.7
Tractor Trailers	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0



Transportation Resource Group, Inc.

204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drwy

York, PA 17401

Municipality: Cumberland Twp.

(717) 846-4660

Day: Thursday

Counter: Steve

File Name : 3880111

Site Code : 03880101

Start Date : 1/14/2010

Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001)

Eisenhower / Allstar Driveway

Emmitsburg Road (S.R.3001)

Southbound

Westbound

Northbound

Start Time

Thru

Left

Right

Left

Right

Thru

Int. Total

15:00

0

0

0

0

0

1

1

15:30

1

0

0

0

0

0

1

Total

1

0

0

0

0

1

2

16:00

0

0

0

0

0

1

1

16:45

1

0

0

0

0

0

1

Total

1

0

0

0

0

1

2

Grand Total

2

0

0

0

0

2

4

Apprch %

100

0

0

0

0

100

Total %

50

0

0

0

0

50

Trucks, Buses

2

0

0

0

0

2

4

% Trucks, Buses

100

0

0

0

0

100

100

Tractor Trailers

0

0

0

0

0

0

0

% Tractor Trailers

0

0

0

0

0

0

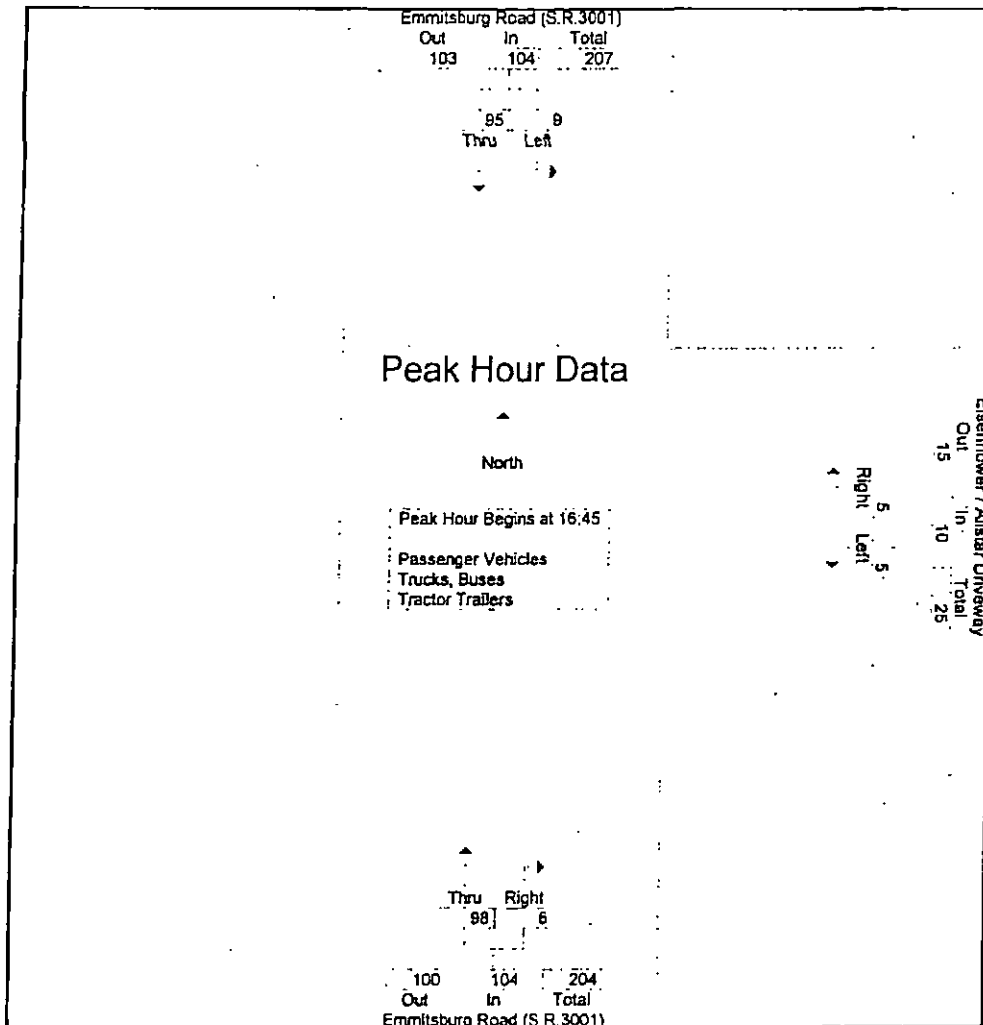
0



Transportation Resource Group, Inc.
 204 North George Street Suite 110
 York, PA 17401
 (717) 846-4660

File Name : 3880111
 Site Code : 03880101
 Start Date : 1/14/2010
 Page No : 2

	Emmitsburg Road (S.R.3001) Southbound				Eisenhower / Allstar Driveway Westbound			Emmitsburg Road (S.R.3001) Northbound			Int. Total
	Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 15:00 to 17:45 - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 16:45											
16:45	27	2	29	1	2	3	0	29	29	61	
17:00	21	3	24	1	0	1	1	25	26	51	
17:15	23	1	24	1	2	3	1	23	24	51	
17:30	24	3	27	2	1	3	4	21	25	55	
Total Volume	95	9	104	5	5	10	6	98	104	218	
% App. Total	91.3	8.7		50	50		5.8	94.2			
PHF	.880	.750	.897	.625	.625	.833	.375	.845	.897	.893	





Transportation Resource Group, Inc.
204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drv
Municipality: Cumberland Twp.
Day: Friday
Counter: Steve

York, PA 17401
(717) 846-4660

File Name : 3880112
Site Code : 03880102
Start Date : 1/15/2010
Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Start Time	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		Int. Total
	Southbound	Left	Westbound	Left	Northbound	Thru	
16:00	18	3	1	1	5	31	59
16:15	23	3	4	1	8	31	70
16:30	30	2	1	0	8	33	74
16:45	32	8	2	1	4	23	70
Total	103	16	8	3	25	118	273
17:00	20	4	3	2	5	23	57
17:15	21	6	4	2	7	22	62
17:30	23	1	2	0	4	29	59
17:45	23	7	0	1	6	27	64
Total	87	18	9	5	22	101	242
18:00	21	4	2	2	7	16	52
18:15	13	2	1	2	1	15	34
18:30	21	3	3	1	8	24	60
18:45	14	2	1	0	8	12	37
Total	69	11	7	5	24	67	183
Grand Total	259	45	24	13	71	286	698
Apprch %	85.2	14.8	64.9	35.1	19.9	80.1	
Total %	37.1	6.4	3.4	1.9	10.2	41	
Passenger Vehicles	258	45	24	13	71	285	696
% Passenger Vehicles	99.6	100	100	100	100	99.7	99.7
Trucks, Buses	0	0	0	0	0	1	1
% Trucks, Buses	0	0	0	0	0	0.3	0.1
Tractor Trailers	1	0	0	0	0	0	1
% Tractor Trailers	0.4	0	0	0	0	0	0.1



Transportation Resource Group, Inc.
204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drw York, PA 17401
Municipality: Cumberland Twp. (717) 846-4660
Day: Friday
Counter: Steve

File Name : 3880112
Site Code : 03880102
Start Date : 1/15/2010
Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

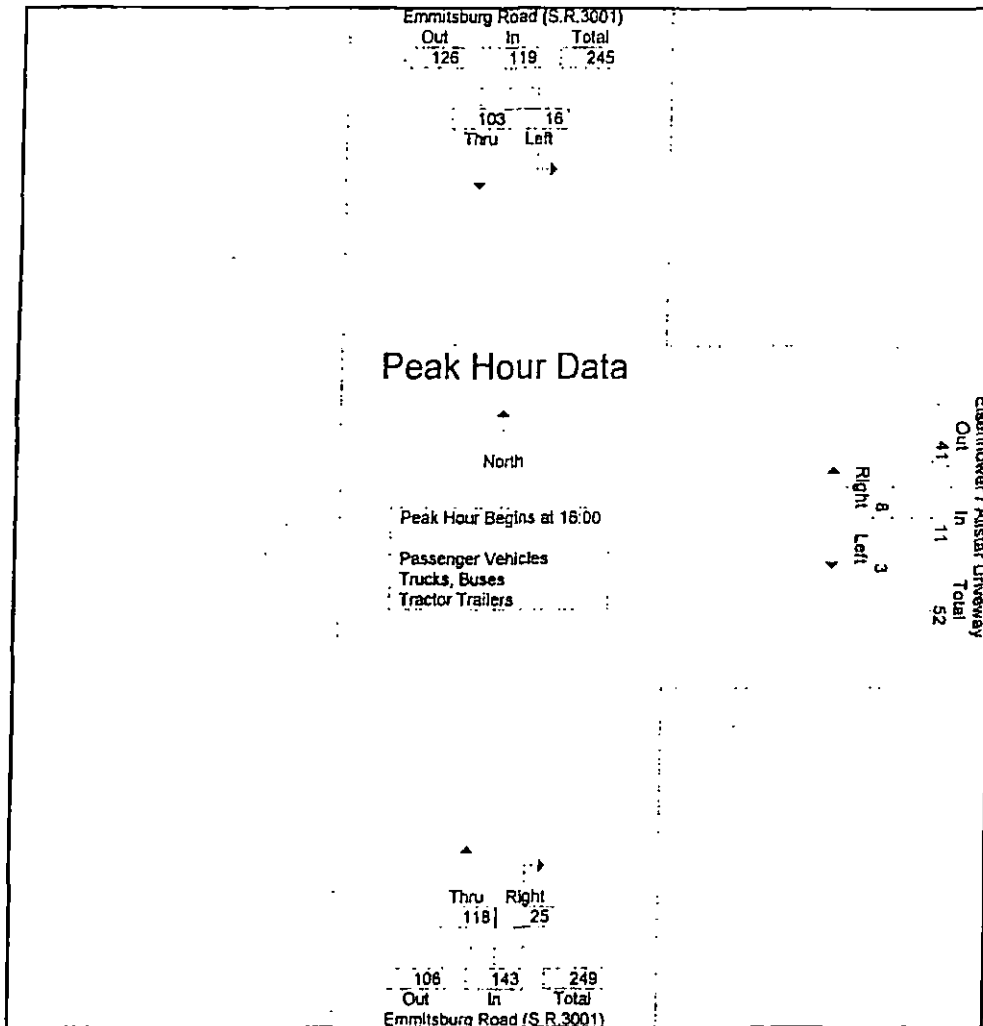
Start Time	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		Int. Total
	Southbound	Left	Westbound	Left	Northbound	Thru	
16:00	0	0	0	0	0	1	1
Total	0	0	0	0	0	1	1
17:15	1	0	0	0	0	0	1
Total	1	0	0	0	0	0	1
Grand Total	1	0	0	0	0	1	2
Apprch %	100	0	0	0	0	100	
Total %	50	0	0	0	0	50	
Trucks, Buses	0	0	0	0	0	1	1
% Trucks, Buses	0	0	0	0	0	100	50
Tractor Trailers	1	0	0	0	0	0	1
% Tractor Trailers	100	0	0	0	0	0	50



Transportation Resource Group, Inc.
 204 North George Street Suite 110
 York, PA 17401
 (717) 846-4660

File Name : 3880112
 Site Code : 03880102
 Start Date : 1/15/2010
 Page No : 2

Emmitsburg Road (S.R.3001) Southbound				Eisenhower / Allstar Driveway Westbound			Emmitsburg Road (S.R.3001) Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 18:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:00										
16:00	18	3	21	1	1	2	5	31	36	59
16:15	23	3	26	4	1	5	8	31	39	70
16:30	30	2	32	1	0	1	8	33	41	74
16:45	32	8	40	2	1	3	4	23	27	70
Total Volume	103	16	119	8	3	11	25	118	143	273
% App. Total	86.6	13.4		72.7	27.3		17.5	82.5		
PHF	.805	.500	.744	.500	.750	.550	.781	.894	.872	.922





Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

Location: Emmitsburg Rd / Eisenhower Drw

Municipality: Cumberland Twp.

Day: Saturday

Counter: Steve

File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001) Eisenhower / Allstar Driveway Emmitsburg Road (S.R.3001)

Start Time	Southbound		Westbound		Northbound		Thru	Int. Total
	Thru	Left	Right	Left	Right			
12:00	19	2	4	3	3	17	48	
12:15	18	5	6	4	1	27	61	
12:30	28	0	3	2	1	24	58	
12:45	17	3	4	1	0	18	43	
Total	82	10	17	10	5	86	210	
13:00	35	3	2	6	2	23	71	
13:15	27	3	2	2	2	17	53	
13:30	33	0	4	0	3	14	54	
13:45	22	5	2	1	1	32	63	
Total	117	11	10	9	8	86	241	
14:00	24	3	5	1	4	16	53	
14:15	27	2	0	1	3	17	50	
14:30	20	1	5	0	1	31	58	
14:45	23	2	1	0	2	11	39	
Total	94	8	11	2	10	75	200	
Grand Total	293	29	38	21	23	247	651	
Apprch %	91	9	64.4	35.6	8.5	91.5		
Total %	45	4.5	5.8	3.2	3.5	37.9		
Passenger Vehicles	292	29	38	21	23	247	650	
% Passenger Vehicles	99.7	100	100	100	100	100	99.8	
Trucks, Buses	1	0	0	0	0	0	1	
% Trucks, Buses	0.3	0	0	0	0	0	0.2	
Tractor Trailers	0	0	0	0	0	0	0	
% Tractor Trailers	0	0	0	0	0	0	0	



Transportation Resource Group, Inc.

204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drw

Municipality: Cumberland Twp.

Day: Saturday

Counter: Steve

York, PA 17401

(717) 846-4660

File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

Start Time	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		Thru	Int. Total
	Southbound	Left	Westbound	Left	Northbound	Right		
13:00	1	0	0	0	0	0	0	1
Total	1	0	0	0	0	0	0	1
Grand Total	1	0	0	0	0	0	0	1
Apprch %	100	0	0	0	0	0	0	
Total %	100	0	0	0	0	0	0	
Trucks, Buses	1	0	0	0	0	0	0	1
% Trucks, Buses	100	0	0	0	0	0	0	100
Tractor Trailers	0	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0	0



Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

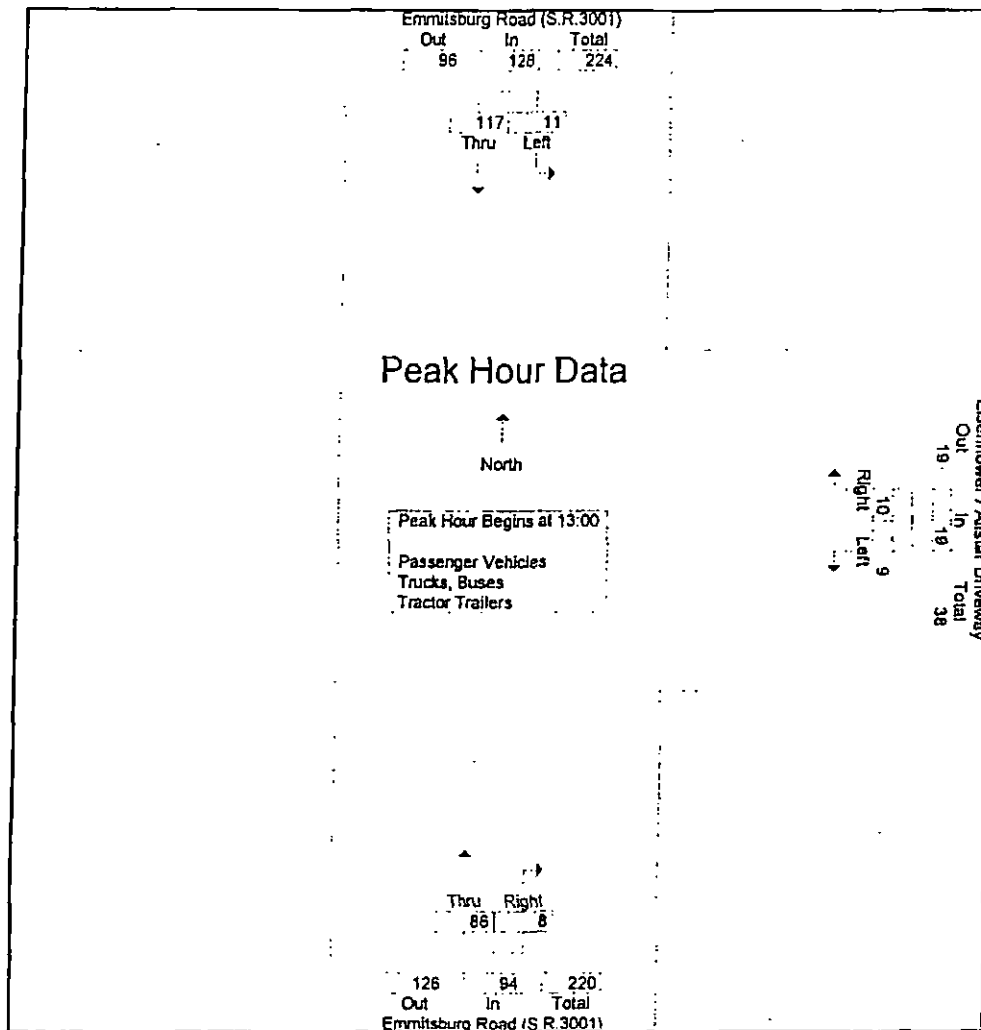
File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 2

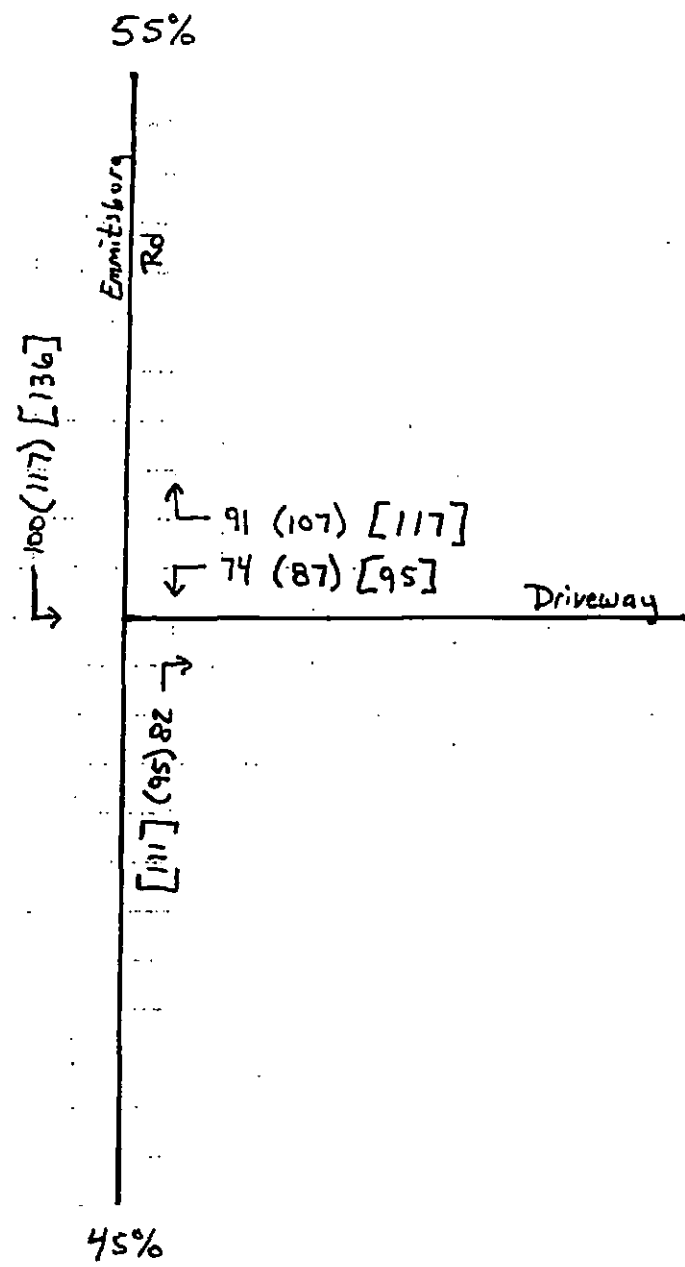
	Emmitsburg Road (S.R.3001) Southbound			Eisenhower / Allstar Driveway Westbound			Emmitsburg Road (S.R.3001) Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 13:00										
13:00	35	3	38	2	6	8	2	23	25	71
13:15	27	3	30	2	2	4	2	17	19	53
13:30	33	0	33	4	0	4	3	14	17	54
13:45	22	5	27	2	1	3	1	32	33	63
Total Volume	117	11	128	10	9	19	8	86	94	241
% App. Total	91.4	8.6		52.6	47.4		8.5	91.5		
PHF	.836	.550	.842	.625	.375	.594	.667	.672	.712	.849





204 N. George Street, Suite 110
York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858
www.consulttrg.com

ject: Mason-Dixon Resort and Ca
Subject: Trip Distribution and Assignment Job No. 388.01
Sheet No. 1 of 1
Computed By DJT Date 1/27 Checked By _____ Date _____



000 (000) [000] PM peak Thursday (PM peak Friday) [Saturday peak]

Table 355

Average Day of Week by Month Factors Compiled for Total Vehicles

The following 12 tables show average day of week factors by month compiled for total vehicles for the year 2008. Current year Automatic Traffic Recorder (ATR) traffic data is assembled and the data is placed in the respective TPG. Annual Average Daily Traffic (AADT) is tabulated individually for each of the 57 ATR stations. A factor is calculated for each day from each station and a list is tabulated by month and day of the week. This data is assembled by day and TPG for each station. The result is a group factor, which can be applied to a 24-hour raw traffic count taken during any day of the year to develop an AADT volume.

Seasonal Factor

January 2008										
DAY	TPG 1	TPG 2	TPG 3	TPG 4	TPG 5	TPG 6	TPG 7	TPG 8	TPG 9	TPG 10
Monday	1.130	1.289	1.102	1.167	1.142	1.264	1.151	1.231	1.155	1.288
Tuesday	1.093	1.297	0.989	1.125	1.078	1.229	1.112	1.191	1.083	1.243
Wednesday	1.060	1.316	0.987	1.120	1.072	1.205	1.076	1.196	1.080	1.330
Thursday	1.030	1.257	0.961	1.075	1.055	1.166	1.054	1.176	1.061	1.224
Friday	0.964	1.125	0.925	0.987	1.008	1.062	0.991	1.068	1.002	1.111
Saturday	1.320	1.429	1.284	1.311	1.208	1.443	1.219	1.299	1.275	1.216
Sunday	1.468	1.367	1.698	1.498	1.377	1.649	1.461	1.520	1.492	1.344
DAY OF MONTH	1.152	1.297	1.135	1.183	1.134	1.288	1.152	1.240	1.164	1.251

February 2008										
DAY	TPG 1	TPG 2	TPG 3	TPG 4	TPG 5	TPG 6	TPG 7	TPG 8	TPG 9	TPG 10
Monday	1.072	1.261	1.016	1.117	1.125	1.190	1.102	1.203	1.114	1.290
Tuesday	1.072	1.349	0.982	1.118	1.089	1.183	1.095	1.169	1.082	1.235
Wednesday	1.035	1.267	0.961	1.084	1.056	1.158	1.019	1.189	1.131	1.201
Thursday	0.992	1.194	0.927	1.035	1.039	1.089	1.029	1.108	1.042	1.192
Friday	0.946	1.094	0.899	0.952	1.010	1.005	0.975	1.052	1.029	0.910
Saturday	1.238	1.384	1.224	1.227	1.171	1.312	1.187	1.252	1.239	1.158
Sunday	1.349	1.324	1.543	1.491	1.348	1.523	1.389	1.501	1.488	1.476
DAY OF MONTH	1.101	1.267	1.079	1.146	1.120	1.209	1.114	1.210	1.160	1.209



McMAHON ASSOCIATES, INC.
3903 Hartzdale Drive | Suite 301 | Camp Hill, PA 17011
p 717-975-0295 | f 717-975-0294
www.mcmtrans.com

February 10, 2010

Timothy Knoebel, P.E.
KPI Technology
1370 Fairfield Road
Gettysburg, PA 17325

PRINCIPALS
Joseph W. McMahon, P.E.
Rodney P. Plourde, Ph.D., P.E.
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
William T. Steffens
Casey A. Moore, P.E.

ASSOCIATES
Gary R. McNaughton, P.E., PTOE
John J. Mitchell, P.E.
Christopher J. Williams, P.E.
John F. Yacapsin, P.E.

RE: **Traffic Engineering Review # 1**
Mason-Dixon Resort and Casino – Traffic Impact Study Scope
Cumberland Township, Adams County
McMahon Project No. 905066.22

Dear Mr. Knoebel:

We have reviewed the scoping letter regarding the traffic impact study for the proposed development of the Mason-Dixon Resort and Casino. It is our understanding that the development will consist of the redevelopment of the Eisenhower Inn and Convention Center and the conversion of the All-Star Family Fun & Sports Complex into a casino and resort with 600 slots and 50 table games. The development is located to the east of Emmitsburg Road (S.R. 3001) between Cunningham Road (S.R. 3008) and Barlow Road (S.R. 3006). Access to the site is proposed to continue to be provided by the existing driveway on Emmitsburg Road (S.R. 3001).

The following document was referenced in preparation of this traffic review letter:

- 1) Proposed Mason-Dixon Resort and Casino Traffic Impact Study Scoping Letter
prepared by TRG, Inc., dated January 27, 2010.

A copy of this letter will be provided to PennDOT as documentation of Cumberland Township's knowledge of the project, and brief discussions were recently held with a representative of the PennDOT District 8-0's Traffic Unit indicating that they will also require a traffic study be submitted to them for review. Based on the information submitted, we offer the following input:

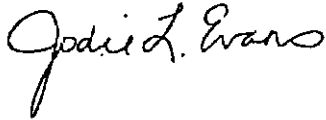
1. Since this development will access a State Road, we recommend that a scoping letter be submitted to PennDOT as well for their review. Although not located within our Township, we expect this development to have a potentially significant impact to the nearest interchange with Route 15 to the south of the site and therefore recommend these intersections be evaluated as well. We recommend the additional study intersections within the Township, beyond the site access, as follows:
 - Emmitsburg Road (S.R. 3001)/ Cunningham Road (S.R. 3008)
 - Emmitsburg Road (S.R. 3001)/ Barlow Road (S.R. 3006)

2. Regarding the traffic count data, it is unclear whether you are proposing to add the new trip generation onto the count data, and if the Eisenhower Inn and Convention Center was in full operation (convention or event scheduled) at the time of the counts. Based on the tourist season, the traffic volumes are expected to be significantly higher in the summer months, with more "typical" traffic during the months of May and September when both school is in session and tourist season tends to begin/wind down. We understand that it may not be feasible to wait until May to count, but we recommend that the Township request an agreement from the developer to conduct a recount and re-evaluation of the study intersections when counts can be obtained during these times of the year. Also, regarding internal capture, the 2% reduction should be taken from the lower traffic-generating land use, which may be the hotel portion of the site—please verify and revise accordingly.
3. Regarding trip generation, we understand that limited trip generation data is available regarding this particular land use, and assumptions must be made for preliminary evaluation of the traffic. That being said, although the specific sites in the study had a similar amount of table games, the trip generation was established based on number of slots and your development will have significantly less slots, therefore it may be underestimating the trip generation for the site if the table games actually generate more traffic per gaming position than the slots. It is recommended that the Township request an agreement with the developer to conduct a trip generation post-development study of the site after full build-out while in full operation to re-evaluate the need for additional improvements and traffic impact fee re-assessment.
4. Regarding trip distribution, it is our understanding that this type of development typically conducts a "marketing study", which indicates their general anticipated trip distribution. Based on the location of this proposed casino compared to other regional casinos, we anticipate a more significant portion of the traffic to travel to/from Route 15 to the south of the site. Please request and review any marketing studies available by the developer and revise your distribution, as applicable.
5. We concur with the proposed analysis scenarios and general background growth rate as outlined in your scoping letter.
6. In addition to the general background growth rate, there are no specific nearby developments within the Township that should be considered for inclusion in the background traffic. Due to the close proximity to the Township limits, PennDOT may be aware of other specific developments in Freedom Township.

Timothy Knoebel, P.E.
February 10, 2010
Page 3

A copy of all future Traffic Impact Studies, Land Development Plans, and Highway Occupancy Permit Plans should be submitted to McMahon for review. Please feel free to contact me with any questions or if you need anything else.

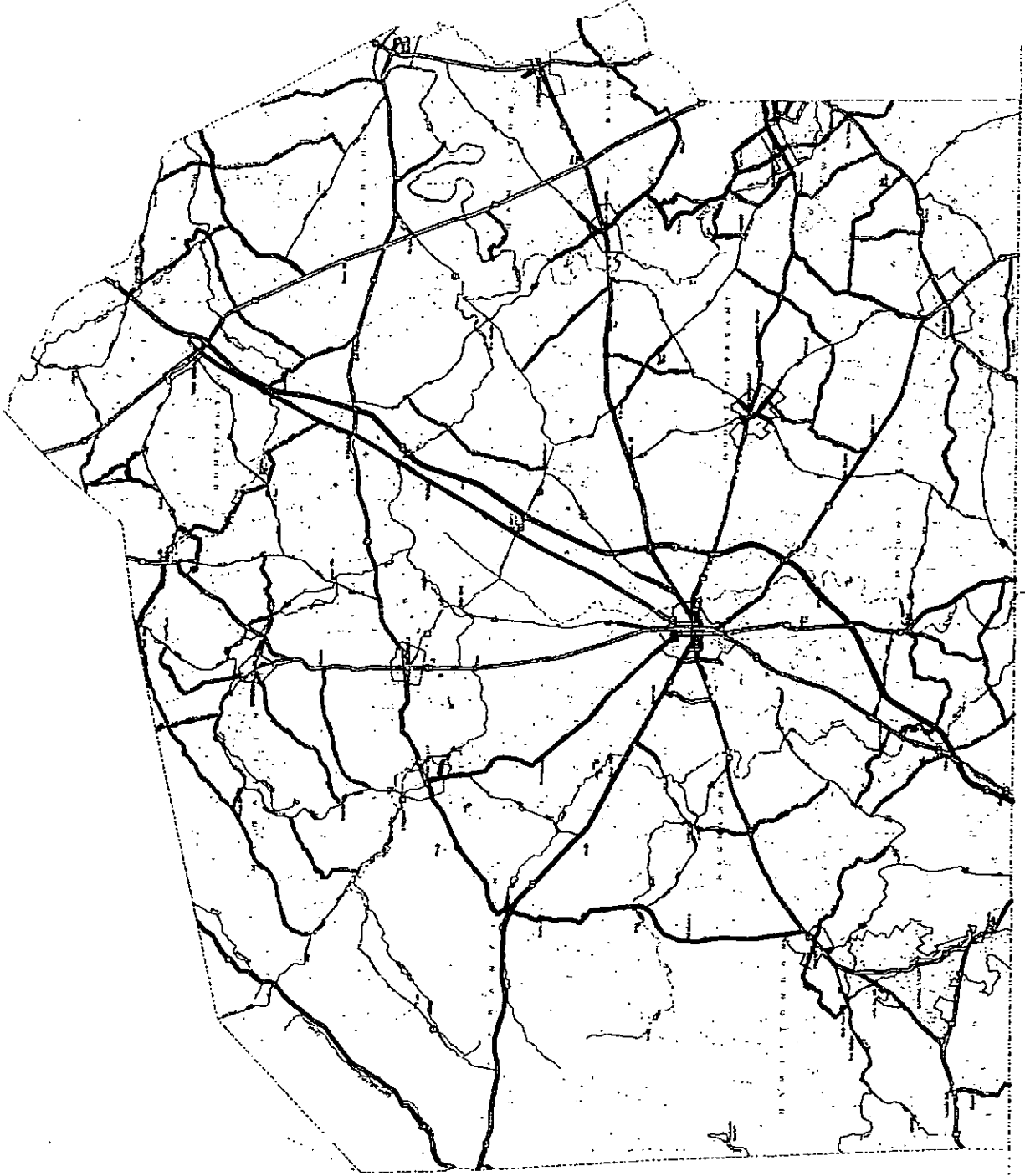
Sincerely,

A handwritten signature in cursive script that reads "Jodie L. Evans".

Jodie L. Evans, P.E., PTOE
Project Manager

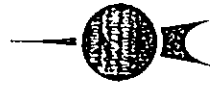
cc: Ms. Florence Ford - Cumberland Township Manager
Mr. Dan Thorton - TRG, Inc.

FEDERAL FUNCTIONAL CLASS ADAMS COUNTY



LEGEND

- INTERSTATE HIGHWAYS (I, 1)
- OTHER FREEWAYS AND EXPRESSWAYS (F)
- OTHER PRINCIPAL ARTERIAL HIGHWAYS (A, 2)
- MAJOR ARTERIALS (A, 3)
- URBAN COLLECTOR OR RURAL MAJOR COLLECTOR (C, 1)
- RURAL MINOR COLLECTOR (C, 2)
- LOCAL ROADS (R, 1)
- 200' URBANIZED AREA BOUNDARY
- 700' SMALL URBAN AREA BOUNDARY



ADAMS COUNTY
FEDERAL FUNCTIONAL CLASS
ROADS

COUNTY

CARROLL

COUNTY

FREDERICK

M A R Y L A N D



150 yds

Copyright © 2001 by the National Aeronautics and Space Administration. All rights reserved. This material is the property of the National Aeronautics and Space Administration and is loaned to you. It and its contents are not to be distributed outside your agency.

Dan Thornton

From: Evans, Jodie [jodie.evans@mcmtrans.com]
Sent: Tuesday, February 23, 2010 3:51 PM
To: Dan Thornton
Cc: Kinard, Eric W
Subject: Mason Dixon Casino and Resort, Cumberland Twp, Adams Co.- change in scope for TIS
Attachments: image001.jpg

Dan,

As discussed earlier, it has been brought to our attention that the bridge is currently closed on Cunningham Road and not anticipated to be open again until 2013. Also, once the bridge re-opens minimal traffic is expected to use this route to travel to/from the Mason-Dixon Resort and Casino, therefore we concur that the Cunningham Road and Emmittsburg Road intersection can be removed from the Traffic Impact Study scope from the Cumberland Township perspective.

Thanks,

Jodie Evans, P.E., PTOE
Project Manager

McMahon Associates, Inc.
3903 Hartzdale Drive, Suite 301
Camp Hill, Pennsylvania 17011
p: 717.975.0295
f: 717.975.0294
jodie.evans@mcmtrans.com



New England | Mid-Atlantic | Florida

Important notice to recipients:

Copies of documents that may be relied upon by you are limited to the printed copies (also known as 'hard copies') that are signed and sealed by the Engineer and/or Land Surveyor. Files in electronic formats, or other types of information furnished by the Engineer and/or Land Surveyor to you such as text, data or graphics are for your convenience only. Any conclusions or information obtained or derived from such electronic files will be at the user's sole risk. When transferring documents in electronic formats, the Engineer and/or Land Surveyor makes no representation as to long-term compatibility, usability, or readability of the documents resulting from the use of software application packages, operating systems or computer hardware differing from those used by McMahon Associates, Inc. at the beginning of the project.



McMAHON ASSOCIATES, INC.
3903 Hartzdale Drive | Suite 301 | Camp Hill, PA 17011
p 717-975-0295 | f 717-975-0294
www.mcmtrans.com

February 10, 2010

Timothy Knoebel, P.E.
KPI Technology
1370 Fairfield Road
Gettysburg, PA 17325

PRINCIPALS
Joseph W. McMahon, P.E.
Rodney P. Plourde, Ph.D., P.E.
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
William T. Steffens
Casey A. Moore, P.E.

ASSOCIATES
Gary R. McNaughton, P.E., PTOE
John J. Mitchell, P.E.
Christopher J. Williams, P.E.
John F. Yacapsin, P.E.

RE: Traffic Engineering Review # 1
Mason-Dixon Resort and Casino – Traffic Impact Study Scope
Cumberland Township, Adams County
McMahon Project No. 905066.22

Dear Mr. Knoebel:

We have reviewed the scoping letter regarding the traffic impact study for the proposed development of the Mason-Dixon Resort and Casino. It is our understanding that the development will consist of the redevelopment of the Eisenhower Inn and Convention Center and the conversion of the All-Star Family Fun & Sports Complex into a casino and resort with 600 slots and 50 table games. The development is located to the east of Emmitsburg Road (S.R. 3001) between Cunningham Road (S.R. 3008) and Barlow Road (S.R. 3006). Access to the site is proposed to continue to be provided by the existing driveway on Emmitsburg Road (S.R. 3001).

The following document was referenced in preparation of this traffic review letter:

- 1) Proposed Mason-Dixon Resort and Casino Traffic Impact Study Scoping Letter
prepared by TRG, Inc., dated January 27, 2010.

A copy of this letter will be provided to PennDOT as documentation of Cumberland Township's knowledge of the project, and brief discussions were recently held with a representative of the PennDOT District 8-0's Traffic Unit indicating that they will also require a traffic study be submitted to them for review. Based on the information submitted, we offer the following input:

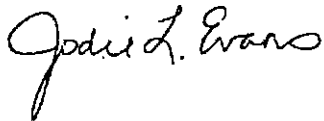
1. Since this development will access a State Road, we recommend that a scoping letter be submitted to PennDOT as well for their review. Although not located within our Township, we expect this development to have a potentially significant impact to the nearest interchange with Route 15 to the south of the site and therefore recommend these intersections be evaluated as well. We recommend the additional study intersections within the Township, beyond the site access, as follows:
 - Emmitsburg Road (S.R. 3001)/ Cunningham Road (S.R. 3008)
 - Emmitsburg Road (S.R. 3001)/ Barlow Road (S.R. 3006)

2. Regarding the traffic count data, it is unclear whether you are proposing to add the new trip generation onto the count data, and if the Eisenhower Inn and Convention Center was in full operation (convention or event scheduled) at the time of the counts. Based on the tourist season, the traffic volumes are expected to be significantly higher in the summer months, with more "typical" traffic during the months of May and September when both school is in session and tourist season tends to begin/wind down. We understand that it may not be feasible to wait until May to count, but we recommend that the Township request an agreement from the developer to conduct a recount and re-evaluation of the study intersections when counts can be obtained during these times of the year. Also, regarding internal capture, the 2% reduction should be taken from the lower traffic-generating land use, which may be the hotel portion of the site—please verify and revise accordingly.
3. Regarding trip generation, we understand that limited trip generation data is available regarding this particular land use, and assumptions must be made for preliminary evaluation of the traffic. That being said, although the specific sites in the study had a similar amount of table games, the trip generation was established based on number of slots and your development will have significantly less slots, therefore it may be underestimating the trip generation for the site if the table games actually generate more traffic per gaming position than the slots. It is recommended that the Township request an agreement with the developer to conduct a trip generation post-development study of the site after full build-out while in full operation to re-evaluate the need for additional improvements and traffic impact fee re-assessment.
4. Regarding trip distribution, it is our understanding that this type of development typically conducts a "marketing study", which indicates their general anticipated trip distribution. Based on the location of this proposed casino compared to other regional casinos, we anticipate a more significant portion of the traffic to travel to/from Route 15 to the south of the site. Please request and review any marketing studies available by the developer and revise your distribution, as applicable.
5. We concur with the proposed analysis scenarios and general background growth rate as outlined in your scoping letter.
6. In addition to the general background growth rate, there are no specific nearby developments within the Township that should be considered for inclusion in the background traffic. Due to the close proximity to the Township limits, PennDOT may be aware of other specific developments in Freedom Township.

Timothy Knoebel, P.E.
February 10, 2010
Page 3

A copy of all future Traffic Impact Studies, Land Development Plans, and Highway Occupancy Permit Plans should be submitted to McMahon for review. Please feel free to contact me with any questions or if you need anything else.

Sincerely,



Jodie L. Evans, P.E., PTOE
Project Manager

cc: Ms. Florence Ford - Cumberland Township Manager
Mr. Dan Thorton -TRG, Inc.

P:\905066.00 - Cumberland Township Reviews - Adams County\90506622 - Mason Dixon Casino\TISScopeReview # 1.doc



204 N. George Street, Suite 110 • York, PA 17401-1108 • T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com

January 27, 2010

Ms. Florence Ford, Manager
Cumberland Township
1370 Fairfield Road
Gettysburg, PA 17325

Re: **Mason-Dixon Resorts, LLC**
Mason-Dixon Resort and Casino
Traffic Impact Study Scoping Letter
Cumberland Township, Adams County
TRG Project No. 388.01

Dear Ms. Ford:

This letter summarizes the proposed traffic impact study scope for the proposed Mason-Dixon Resort and Casino located to the east of Emmitsburg Road (S.R.3001) in Cumberland Township, Adams County. Currently on site is the Eisenhower Inn and Conference Center and the All-Star Family Fun & Sports Complex. Access to the existing facilities is provided by an existing full movement driveway on Emmitsburg Road (S.R.3001) to the south of Barlow Greenmount Road.

As part of the proposed development, the All-Star Family Fun building is proposed to be converted to a casino. The size of the building will not change but will be renovated to accommodate the casino's need. The casino is proposed to have 600 slots and 50 table games at this time. Access to the proposed casino will continue to be provided by the full movement driveway on Emmitsburg Road (S.R.3001). An aerial of the tract of land is attached for your reference.

As part of the traffic impact study, we are proposing the following study scope:

Study Intersections

- Emmitsburg Road (S.R.3001)/Existing Driveway

Trip Generation

The trip generation for the site was determined based on an ITE article "Trip Generation Characteristics of Small to Medium Sized Casinos". A copy of the ITE article is attached. The article describes the trip generation for five small to medium casinos that had slots and tables. The casinos in the article had more slots than the proposed Mason-Dixon Resorts and Casino will have but the total number of tables are comparative. Therefore, the trip generation rates

included in the article will be utilized to determine the anticipated traffic for the proposed casino. Based on the information in the article, the Adjacent Street Peak Hour Trip Generation table will be utilized for the PM peak hour (Thursday) and the Facility Peak Hour Trip Generation table will be utilized for the PM peak hour (Friday) and for the Saturday peak hour. A table is attached that summarizes the anticipated trip generation.

Due to the existing Eisenhower Inn and Conference Center located on the site as well, an internal capture will be assumed from the hotel to the proposed casino. While ITE Trip Generation Handbook does not have an internal capture percentage between lodging and recreational, it was assumed that 2% of the trips to/from the proposed casino will be from the existing Eisenhower Hotel and will never leave the site. The attached trip generation table shows the proposed internal capture for the proposed casino.

Trip Distribution

Trip distribution will be determined based on the existing turning movement counts (TMC) conducted at the site access intersection. Copies of the existing traffic counts are attached. The anticipated trip distribution will be assumed as follows:

- 55% oriented to/from the north on Emmitsburg Road (S.R.3001)
- 45% oriented to/from the south on Emmitsburg Road (S.R.3001)

A sketch is attached that shows the anticipated trip distribution and assignment for the proposed casino.

Study Time Periods

The study periods for analysis are proposed as follows:

- Weekday Thursday PM Peak Hour 3:00 – 6:00 PM
- Weekday Friday PM Peak Hour 4:00 – 7:00 PM
- Saturday Peak Hour 12:00 – 3:00 PM

The traffic counts were conducted in January 2010 and will be seasonally factored using guidelines from PennDOT Traffic Data. Copies of the seasonal factors are attached. Automatic traffic recorder (ATR) counts will also be conducted on Emmitsburg Road (S.R.3001) and the existing driveway.

Analysis Scenarios

The following analysis scenarios are proposed based on an opening year of 2011 and a 5 year design period:

- Existing traffic volumes
- 2011 traffic volumes without development
- 2011 traffic volumes with development
- 2016 traffic volumes without development
- 2016 traffic volumes with development

Ms. Florence Ford
January 27, 2010
Page 3

The background growth rate factor will be determined based on PennDOT's Growth Factors for July 2009 to July 2010. For this development, the growth rate factor is 0.86% per year.

Please review the attached information and respond in writing with your required scope of work. We are also requesting any developments and/or committed roadway improvements within our study area that the Township will require to be included in the Traffic Impact Analysis for the proposed development.

If you have any questions, please feel free to give me a call.

Very truly yours,
Transportation Resource Group, Inc.



Daniel J. Thornton, P.E.
Senior Associate

DJT/vaw
Attachments

cc: David LeVan, Mason-Dixon Resorts, LLC
Bernard A. Yannetti, Jr., Esquire, Hartman & Yannetti
Timothy R. Knoebel, P.E., KPI Technology
Jodie Evans, P.E., PTOE, McMahon Associates, Inc.

Trip Generation Characteristics of Small to Medium Sized Casinos

Michael Trueblood, Tara Gude

OVERVIEW

This paper focuses on trip generation for small to medium sized casinos that are not part of a cluster of casinos. The data collection for this paper included three casinos located in Council Bluffs, Iowa. Two of the casinos are riverboat casinos and are located along the Missouri River, while the other casino includes an existing dog racetrack that later added slot machines.

In addition to the casinos located in Council Bluffs, the calculated trip generation rates were compared to rates included in a March 1998 ITE Journal article entitled *Gaming Casino Traffic*. The article calculated trip generation rates for two casinos in the St. Louis metropolitan area, the Casino Queen and the St. Charles Casino.

There is not an overwhelming amount of trip generation information available for casinos located outside of the typical Las Vegas or Atlantic City stereotype. The trip generation characteristics of casinos found in large clusters, like those in Las Vegas for example, are not similar to the casinos that will be covered in this article. For comparison purposes the MGM Grand Casino in Las Vegas has over 5,000 hotel rooms with over 3,500 slot machines, while the Treasure Island Casino has over 2,900 hotel rooms with over 2,000 slot machines. The trip generation characteristics of these casinos are quite different than the five covered in this paper due to their immense size and popularity. Another reason these casinos have different trip generation characteristics is because they are accessible by foot. In Las Vegas people tend to walk to and from the casinos or drive to one and then walk to several others throughout the course of a day.

It should be noted that each state has different rules and regulations that govern the actual type of establishment that can be used for gambling. Recent regulations have changed or have been modified in order to allow gambling facilities to be established beyond the typical riverboat casinos. Examples of these casinos are those operated by Indian Tribes. There are several casinos operated by Indian Tribes across the country. These casinos range in size, but they are good examples of the types of casinos this paper addresses.

LOCATION OF CASINOS

This section will provide a brief overview of the location of the three Council Bluffs casinos and the two casinos located in the St. Louis metropolitan area. The casino locations are shown in Figure 1. The three casinos in Council Bluffs, Iowa are located near the Missouri River in the Omaha metropolitan area. The Ameristar Casino and Harvey's Casino are located along the river within one mile of each other in the northwest quadrant of the I-29/I-80 interchange. Bluffs Run Casino is located about two miles east of these casinos along I-80. For comparison purposes to other casino locations, the 1998 average daily traffic (ADT) along I-29 was 40,500 vehicles, while the 1998 ADT along I-80 was 67,400 vehicles. The estimated 1999 population is 1,040,000 people within a 50-mile radius of the casinos.

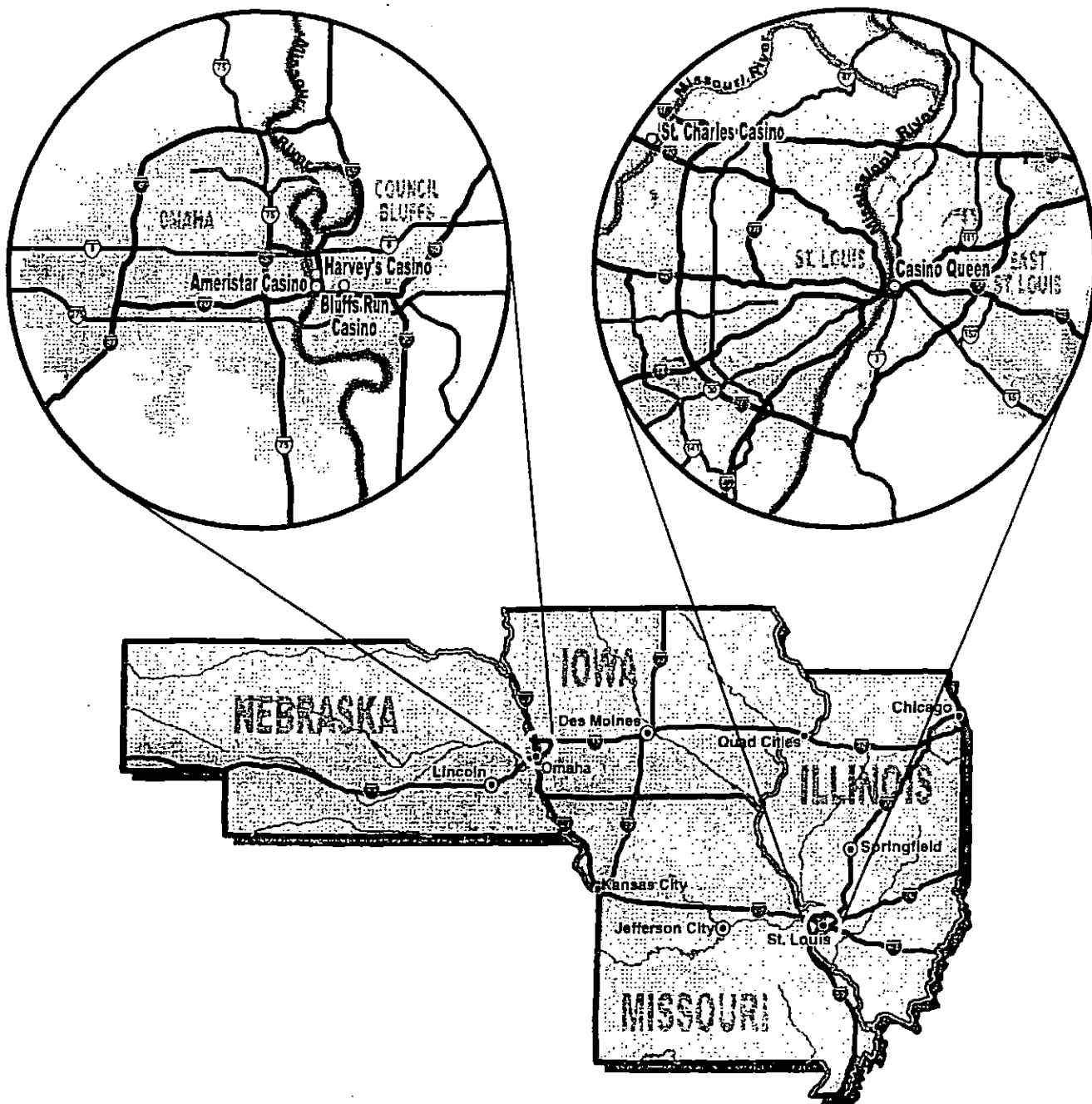


Figure 1 – Casino Location Map

The two St. Louis area casinos are also depicted in Figure 1. The St. Charles Casino is located along the Missouri River immediately north of I-70/Missouri River junction and about five miles to the west of I-270/I-70 junction in the City of St. Charles. The 1998 ADT along I-70 was 188,000 vehicles. The Casino Queen is located along the Mississippi River immediately east of the Gateway Arch and immediately north of the I-70/I-64/I-55 junction in the City of East St. Louis, Illinois. The ADT of these three interstates are 117,300 vehicles. The estimated 1999 population is 2,637,000 people within a 50-mile radius of the St. Louis area casinos.

GAMING REVENUES OF STUDY CASINOS

This section discusses the gaming revenues of the tri-state region where the five casinos presented in this paper are located. Between the years 1994-1999, St. Charles Casino had the second highest attendance of the eleven riverboat casinos within the state of Missouri. During the fiscal year 2000 the eleven riverboat casinos made over \$1.0 billion in adjusted gross revenues (AGRs). In Illinois, the nine riverboat casinos made over \$1.66 billion AGRs in 2000, with the Casino Queen ranked fifth out of the nine riverboats. In Iowa, Harvey's Casino and Ameristar Casino ranked one and two out of ten casinos in AGRs, respectively. The ten casinos in Iowa combined for over \$575 million in AGRs. Casinos within the State of Iowa that also have pari-mutuel wagering are accounted for separately in terms of their AGRs. Bluffs Run Casino was ranked two out of three casinos in AGRs. The three racetrack casinos, as they are called in Iowa, combined for over \$300 million in AGRs in 2000.

TRIP GENERATION CHARACTERISTICS OF STUDY CASINOS

Most of the available information concerning trip generation of casinos is related to large casinos or clusters of several casinos, such as those in Las Vegas. In order to determine the trip generation characteristics of small to medium sized casinos, HDR collected traffic information at three casinos in Council Bluffs, Iowa. Once the trip generation rates were computed, they were compared to trip generation rates of two St. Louis area casinos documented in a March 1998 issue of the ITE Journal.

Table 1 documents the five casinos' characteristics. It should be noted that the information for the Council Bluffs casinos is for the year 2000, while the information for the St. Louis casinos was collected in 1998.

Table 1 – General Casino Information

Amenities	Council Bluffs, Iowa			St. Louis Metro Area	
	Harvey's	Ameristar	Bluffs Run	St. Charles	Casino Queen
Slots	1169	1446	1479	1847	1020
Total Tables	53	51	0	90	51
Gaming sq. ft.	28,250	38,000	34,280	50,000	27,500
Hotel Rooms	251	356	0	<i>Not Applicable</i>	<i>Not Applicable</i>
Employees	1257	1329	1046	<i>Not Available</i>	1079
Pari-mutuel Wagering	No	No	Yes	No	No
Convention Center (seats)	900	170	No	<i>Not Available</i>	<i>Not Available</i>

The data collection for the Council Bluffs casinos was conducted during the following times:

- Ameristar – Saturday, July 15th to Tuesday, July 25th, 2000.
- Harvey's – Thursday, July 20th to Sunday, July 30th, 2000.
- Bluffs Run – Wednesday, July 19th to Saturday, July 29th and Saturday August 19th to Monday August 28th, 2000.

Automatic tube recorders were placed at all entrances and exits to the casinos. Data was collected in fifteen-minute intervals, 24-hours a day for each of the casinos. All five casinos operated on a 24-hour basis. As will be discussed later, the hourly information was unique when compared to other land uses. The following sections provide detailed information on the trip generation characteristics of the three Council Bluffs casinos. These rates were compared to the two St. Louis casinos and since the rates for all five casinos were similar, an average trip generation rate was computed.

Peak Hour Trip Generation Rates

A trip generation rate was calculated based on the number of slot machines that were located at each casino. Generation rates were calculated for both weekdays and weekends. Weekday trip generation rates were calculated for both the peak of facility and peak of adjacent street traffic. Traffic studies for new developments generally analyze the weekday peak hour of adjacent street traffic. However, several types of developments generate higher traffic levels during times other than the adjacent street traffic peak hour. Data from the casinos indicate that their peak trip generation rates are different than the peak hour of adjacent street traffic. Table 2 depicts the average PM peak hour trip generation rates of the five casinos for the peak hour of facility, while Table 3 depicts the average PM peak hour trip generation rate for the adjacent street traffic. The PM peak hour was chosen for purposes of calculating trip generation rates because they were generally higher than the AM peak hour. Tables A1, A2, and A3 located at the end of the paper document the three Iowa casinos daily raw peak hour and time of day data.

Table 2 – Facility Peak Hour Trip Generation

	PM Peak Hour										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	502	380	423	477	537	491	725	625	348	336	507	462
Saturday/Sunday	482	375	624	471	553	579	850	750	Not Available		627	544
	PM Peak Hour Per Slot										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips Per Slot	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	0.43	0.33	0.29	0.33	0.36	0.33	0.39	0.34	0.34	0.33	0.36	0.33
Saturday/Sunday	0.41	0.32	0.43	0.33	0.37	0.39	0.46	0.41	Not Available		0.42	0.36

Note: St. Charles weekday rate is for Friday only.

Table 3 – Adjacent Street Peak Hour Trip Generation

	PM Peak Hour										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	453	340	427	378	442	373	475	600	Not Available		449	423
Saturday/Sunday	423	334	491	413	490	467	Not Available	Not Available			468	404
	PM Peak Hour Per Slot										Average PM Peak	
	Harvey's		Ameristar		Bluffs Run		St. Charles		Casino Queen		Hour Trips Per Slot	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Monday - Friday	0.39	0.29	0.29	0.26	0.30	0.25	0.26	0.32	Not Available		0.31	0.28
Saturday/Sunday	0.36	0.29	0.34	0.29	0.33	0.32	Not Available	Not Available			0.34	0.30

Note: St. Charles weekday rate is for Friday only.

The PM peak hour trip generation rates were similar for each of the three Council Bluffs casinos. These rates were found to be comparable to the two St. Louis area casinos' trip generation rates. As shown above in Table 3, there is a correlation between the number of slot machines and the traffic generated by the casinos. For example, the two St. Louis area casinos have a difference in the number of trips generated by the facility. However when the trip generation rates were developed on a per slot machine basis, the rates are quite similar. Even though the St. Charles Casino has 800 slot machines more than the Casino Queen, their trip generation rates are comparable.

HDR's analysis of the five casinos in St. Louis and Council Bluffs found that their average weekday PM peak hour of adjacent street traffic trip generation rate was 0.59 trips per slot machine, while the average weekend PM peak hour trip generation rate was 0.64 trips per slot machine. These rates were close to the weekday and weekend PM peak hour of generator, which were 0.69 trips and 0.78 trips per slot machine, respectively.

The original trip generation rates calculated for the St. Louis area casinos were based on gaming positions. For purposes of this paper the rates provided in the March ITE Journal article were converted to trips per slot machine. This was done in order to directly compare the Council Bluffs and St. Louis trip generation rates. Gaming positions are calculated based on each type of game and are a percentage of the number of slot machines. Thus, calculating the number of gaming positions can get cumbersome. The other reason slot machines were used to calculate trip generation rates was because Bluffs Run Casino does not have table games.

Daily Trip Generation Rates

Table 4 shows the ADTs that were collected for the three Iowa casinos. An average daily trip rate was developed based on information from the three Iowa casinos and from the St. Charles Casino. Not enough information was available in order to include the Casino Queen in these calculations. Table 5 shows the weekday and weekend daily trip rates for each of the four casinos in addition to an average daily trip rate.

Table 4 – Average Daily Traffic (ADT)

Day	Harvey's Daily Volume			Ameristar Daily Volume			Bluffs Run Daily Volume		
	Inbound Volume	Outbound Volume	ADT	Inbound Volume	Outbound Volume	ADT	Inbound Volume	Outbound Volume	ADT
Sunday	7,038	6,749	13,787	7,438	8,175	15,613	8,871	8,887	17,758
Monday	5,402	4,745	10,147	5,378	5,394	10,771	6,665	6,741	13,406
Tuesday	9,334	8,496	17,830	6,903	6,761	13,663	7,702	7,180	14,882
Wednesday	6,401	5,221	11,622	5,823	5,730	11,553	7,499	6,827	14,326
Thursday	6,944	5,462	12,406	5,845	5,703	11,548	8,494	7,867	16,361
Friday	8,230	5,938	14,168	8,043	7,460	15,503	9,211	8,441	17,652
Saturday	8,075	7,025	15,100	8,311	8,129	16,440	9,957	9,392	19,349

Table 5 – Average Daily Traffic Rates

	ADT				ADT per slot				Average ADT per slot
	Harvey's	Ameristar	Bluffs Run	St. Charles	Harvey's	Ameristar	Bluffs Run	St. Charles	
Monday - Friday	13,249	12,496	15,325	17,362	11.33	8.64	10.36	9.40	9.93
Saturday/Sunday	14,443	16,026	18,554	19,959	12.36	11.08	12.54	10.81	11.70

Note: St. Charles weekday rate is for Friday only.

The ADT was higher on weekend days compared to weekdays. As shown in Table 4 there was more than a 50% increase in the ADT on weekends at some of the casinos. Another interesting factor that made relatively large increases in ADT was the special promotions that the casinos offer. For example, Harvey's Casino had double points for slot club members on Tuesdays, which generated more traffic than a typical weekend day. Double points allow slot club members to earn extra points that can be redeemed for cash.

Another finding of interest was the amount of traffic that occurs during the late night hours. It was assumed that this was related to the fact that all five casinos evaluated in this paper were located within a metropolitan area and relatively close to an interstate. Table 6 documents the time variation of trips at the three Council Bluffs casinos and the St. Charles Casino. Again, data was not available for Casino Queen.

Table 6 – Casino Related Time Variations of Trips

	Percentage of Traffic during each time period									
	Harvey's		Ameristar		Bluffs Run		St. Charles		Average	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
9 AM - 9 PM	64.6	58.4	69.0	61.9	66.1	59.5	65.7	69.5	66.3	62.3
9 PM - 9 AM	35.4	41.6	31.0	38.1	33.9	40.5	34.3	30.5	33.6	37.7
12 AM - 6 AM	10.9	17.9	9.2	16.2	10.9	17.4	13.8	9.0	11.2	15.1
6 AM - 12 PM	21.0	19.6	20.7	17.3	23.1	20.8	15.8	19.0	20.1	19.2
12 PM - 6 PM	34.3	31.2	37.9	32.3	34.7	31.7	34.6	33.6	35.4	32.2
6 PM - 12 AM	33.8	31.3	32.3	34.1	31.3	30.1	35.8	38.4	33.3	33.5

Generally, most land uses do not operate on a 24-hour basis. As a result, roadways located near these casinos tend to have more traffic on them during the late night hours. The daily trip information is important because it captures some of the impacts related to off-peak traffic levels. This could lead to potential concerns of nearby residents or business owners. If the location of a potential casino was proposed near a neighborhood, the future casino could cause lighting, noise, or other environmental concerns. Our data shows some justification to these concerns over late-night traffic. Typically between the hours of 12:00 AM and 6:00 AM most land uses are not in operation and thus do not generate trips. These four casinos, on the other hand, averaged over 15% of their daily trips during these same hours. This could lead to potential complaints by nearby residents or businesses.

SUMMARY

This paper included the trip generation rates of three Iowa casinos and compared their rates to that of two St. Louis casinos included in a March 1998 ITE Journal article. In general, the five casinos had comparable trip generation rates for both weekdays and weekends. These rates could be used when determining the viability of a proposed casino or the expansion of an existing casino. As always, data collected at or near the actual casino site should be used, but if this is not possible, these rates could provide for a relative comparison of whether the nearby roadways could handle the increase in traffic due to the casino.

HDR's analysis of the five casinos found that their average weekday PM peak hour of adjacent street traffic trip generation rate was 0.59 trips per slot machine, while the average weekend PM peak hour trip generation rate was 0.64 trips per slot machine. These rates were close to the weekday and weekend PM peak hour of generator, which were 0.69 trips and 0.78 trips per slot machine, respectively. The average weekday ADT was 9.93 trips per slot, while the weekend average ADT was 11.70 trips per slot.

It should also be noted that these casinos could be considered isolated in terms of walking from one to another. The generation rates of casinos that are found in clusters (Las Vegas) have different characteristics than the casinos studied in this paper. This can be related to the large number and size of casinos located within the clusters and the fact that they are generally located very close to each other. Another important piece of information that should be reviewed is a market analysis. A market analysis could give an estimate of the daily admissions expected at the casino. This could give an indication if these rates are applicable to the proposed casino. As with all land uses, variations in trip generation rates will exist, but knowing what the potential traffic impact could be is better than not having any comparative information.

Authors Information

Michael T. Trueblood, P.E., P.T.O.E
Traffic Engineer
HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114
(402) 399-1277
Email: mtrueblo@hdrinc.com

Tara Gude, E.I.
Traffic Engineer
HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114
(402) 399-1322
Email: tgude@hdrinc.com

REFERENCES

1. Box, Paul C., Bunte, William. *Gaming Casino Traffic*. ITE Journal, March 1998.
2. State of Iowa Website, *Iowa Racing and Gaming Commission, Riverboat Revenue Report and Track Gaming Report* for YTD 7/01/99 thru 06/30/00, www3.state.ia.us.
3. Illinois Gaming Board Website, *Monthly Riverboat Casino Report* (calendar year-to-date through December 2000). www.igb.state.il.us.
4. Gaming Magazine Website, *Missouri Gaming Revenue Hit \$1 Billion Last Year*, www.gamingmagazine.com
5. Missouri Riverboat Gaming Association Website, *Analysis of Riverboat Gaming, Fiscal Year 1994-1999 Admissions*. www.mrga.org.
6. MGM Grand Casino Website, www.mgmgrand.com.
7. Treasure Island Casino Website, www.treasureisland.com.

Table A1 – Harvey's Peak Hour Raw Data

Day	Date	AM Peak Hour			PM Peak Hour		
		Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Thursday	7/20/00	11:00	358	209	6:00	458	317
Friday	7/21/00	10:45	323	252	5:00	548	387
Saturday	7/22/00	10:00	285	273	5:30	591	380
Sunday	7/23/00	11:00	433	265	3:30	409	462
Monday	7/24/00	10:45	280	208	4:30	347	279
Tuesday	7/25/00	11:00	562	469	6:00	715	606
Wednesday	7/26/00	10:45	320	203	5:00	440	352
Thursday	7/27/00	11:00	362	263	6:00	493	319
Friday	7/28/00	10:45	412	179	5:30	512	403
Saturday	7/29/00	11:00	304	256	5:00	518	317
Sunday	7/30/00	11:00	345	271	3:15	410	342

Table A2 – Ameristar Peak Hour Raw Data

Day	Date	AM Peak Hour			PM Peak Hour		
		Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Saturday	7/15/00	10:30	363	240	5:30	596	420
Sunday	7/16/00	11:00	379	388	6:00	609	543
Monday	7/17/00	10:45	248	282	3:15	314	435
Tuesday	7/18/00	11:00	430	287	3:00	463	637
Wednesday	7/19/00	10:45	340	230	5:30	429	334
Thursday	7/20/00	10:45	356	228	3:00	349	471
Friday	7/21/00	11:00	364	283	5:45	662	441
Saturday	7/22/00	11:00	370	265	5:45	700	461
Sunday	7/23/00	11:00	409	351	5:45	592	461
Monday	7/24/00	10:45	299	289	3:15	319	462
Tuesday	7/25/00	11:00	458	343	3:00	427	557

Table A3 – Bluffs Run Peak Hour Raw Data

Day	AM Peak Hour			PM Peak Hour		
	Time	Inbound Volume	Outbound Volume	Time	Inbound Volume	Outbound Volume
Monday	11:00	348	420	15:00	443	416
Tuesday	10:45	436	393	15:00	549	513
Wednesday	11:00	417	310	15:00	542	474
Thursday	10:45	425	370	15:30	571	507
Friday	11:00	406	379	15:30	580	544
Saturday	11:00	478	361	16:00	486	635
Sunday	10:15	423	378	15:00	620	523

Table 1 Estimated Trip Generation (Mason-Dixon Resort and Casino)											
Land Use (Code)	Type	PM Peak Hour (Thursday)			PM Peak Hour (Friday)			Saturday Peak Hour			Average Weekday Daily Traffic
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total	
Casino (600 slots)	New	182	165	347	212	194	406	247	212	459	5958
	Internalization 2%	4	3	7	4	4	8	5	4	9	
	Total	186	168	354	216	198	414	252	216	468	



Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

Location: Emmitsburg Rd / Eisenhower Drwy

Municipality: Cumberland Twp.

Day: Thursday

Counter: Steve

File Name : 3880111

Site Code : 03880101

Start Date : 1/14/2010

Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001) Eisenhower / Allstar Driveway Emmitsburg Road (S.R.3001)

Start Time	Southbound		Westbound		Northbound		Int. Total
	Thru	Left	Right	Left	Right	Thru	
15:00	19	2	0	4	1	15	41
15:15	21	1	3	1	2	20	48
15:30	16	3	6	2	0	23	50
15:45	23	1	11	5	1	16	57
Total	79	7	20	12	4	74	196
16:00	19	3	2	3	4	17	48
16:15	11	4	2	4	1	20	42
16:30	17	3	1	1	4	15	41
16:45	27	2	1	2	0	29	61
Total	74	12	6	10	9	81	192
17:00	21	3	1	0	1	25	51
17:15	23	1	1	2	1	23	51
17:30	24	3	2	1	4	21	55
17:45	14	2	0	1	10	19	46
Total	82	9	4	4	16	88	203
Grand Total	235	28	30	26	29	243	591
Apprch %	89.4	10.6	53.6	46.4	10.7	89.3	
Total %	39.8	4.7	5.1	4.4	4.9	41.1	
Passenger Vehicles	233	28	30	26	29	241	587
% Passenger Vehicles	99.1	100	100	100	100	99.2	99.3
Trucks, Buses	2	0	0	0	0	2	4
% Trucks, Buses	0.9	0	0	0	0	0.8	0.7
Tractor Trailers	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0



Transportation Resource Group, Inc.

204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drwy

York, PA 17401

Municipality: Cumberland Twp.

(717) 846-4660

Day: Thursday

Counter: Steve

File Name : 3880111

Site Code : 03880101

Start Date : 1/14/2010

Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

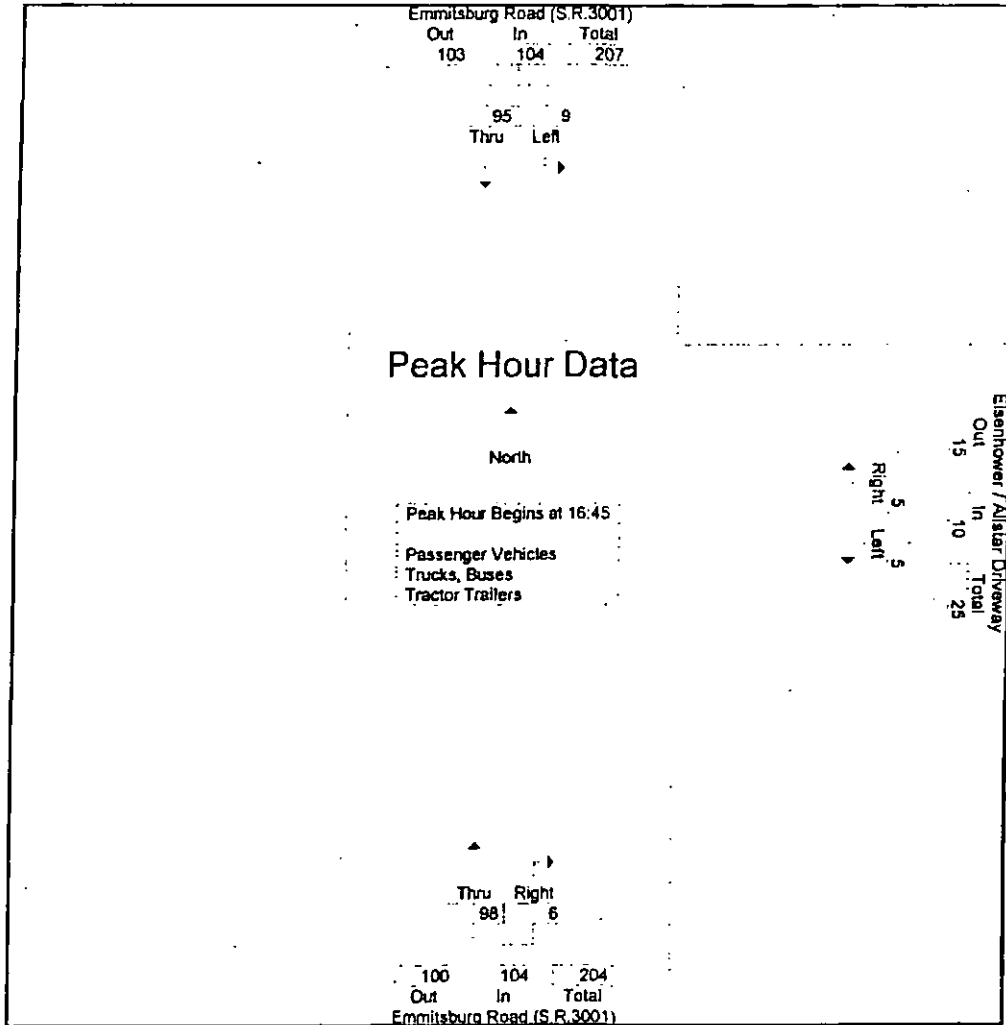
	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		
	Southbound		Westbound		Northbound		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
15:00	0	0	0	0	0	1	1
15:30	1	0	0	0	0	0	1
Total	1	0	0	0	0	1	2
16:00	0	0	0	0	0	1	1
16:45	1	0	0	0	0	0	1
Total	1	0	0	0	0	1	2
Grand Total	2	0	0	0	0	2	4
Apprch %	100	0	0	0	0	100	
Total %	50	0	0	0	0	50	
Trucks, Buses	2	0	0	0	0	2	4
% Trucks, Buses	100	0	0	0	0	100	100
Tractor Trailers	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0



Transportation Resource Group, Inc.
 204 North George Street Suite 110
 York, PA 17401
 (717) 846-4660

File Name : 3880111
 Site Code : 03880101
 Start Date : 1/14/2010
 Page No : 2

Emmitsburg Road (S.R.3001)				Eisenhower / Allstar Driveway			Emmitsburg Road (S.R.3001)			Int. Total
Southbound				Westbound			Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 15:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:45										
16:45	27	2	29	1	2	3	0	29	29	61
17:00	21	3	24	1	0	1	1	25	26	51
17:15	23	1	24	1	2	3	1	23	24	51
17:30	24	3	27	2	1	3	4	21	25	55
Total Volume	95	9	104	5	5	10	6	98	104	218
% App. Total	91.3	8.7		50	50		5.8	94.2		
PHF	.880	.750	.897	.625	.625	.833	.375	.845	.897	.893





Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

Location: Emmitsburg Rd / Eisenhower Drw

Municipality: Cumberland Twp.

Day: Friday

Counter: Steve

File Name : 3880112

Site Code : 03880102

Start Date : 1/15/2010

Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001)

Eisenhower / Allstar Driveway

Emmitsburg Road (S.R.3001)

Start Time	Southbound		Westbound		Northbound		Thru	Int. Total
	Thru	Left	Right	Left	Right	Thru		
16:00	18	3	1	1	5	31	59	
16:15	23	3	4	1	8	31	70	
16:30	30	2	1	0	8	33	74	
16:45	32	8	2	1	4	23	70	
Total	103	16	8	3	25	118	273	
17:00	20	4	3	2	5	23	57	
17:15	21	6	4	2	7	22	62	
17:30	23	1	2	0	4	29	59	
17:45	23	7	0	1	6	27	64	
Total	87	18	9	5	22	101	242	
18:00	21	4	2	2	7	16	52	
18:15	13	2	1	2	1	15	34	
18:30	21	3	3	1	8	24	60	
18:45	14	2	1	0	8	12	37	
Total	69	11	7	5	24	67	183	
Grand Total	259	45	24	13	71	286	698	
Apprch %	85.2	14.8	64.9	35.1	19.9	80.1		
Total %	37.1	6.4	3.4	1.9	10.2	41		
Passenger Vehicles	258	45	24	13	71	285	696	
% Passenger Vehicles	99.6	100	100	100	100	99.7	99.7	
Trucks, Buses	0	0	0	0	0	1	1	
% Trucks, Buses	0	0	0	0	0	0.3	0.1	
Tractor Trailers	1	0	0	0	0	0	1	
% Tractor Trailers	0.4	0	0	0	0	0	0.1	



Transportation Resource Group, Inc.

204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drw

York, PA 17401

Municipality: Cumberland Twp.

(717) 846-4660

Day: Friday

Counter: Steve

File Name : 3880112

Site Code : 03880102

Start Date : 1/15/2010

Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

Start Time	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		Incl Total
	Southbound	Left	Westbound	Left	Northbound	Thru	
16:00	0	0	0	0	0	1	1
Total	0	0	0	0	0	1	1
17:15	1	0	0	0	0	0	1
Total	1	0	0	0	0	0	1
Grand Total	1	0	0	0	0	1	2
Apprch %	100	0	0	0	0	100	
Total %	50	0	0	0	0	50	
Trucks, Buses	0	0	0	0	0	1	1
% Trucks, Buses	0	0	0	0	0	100	50
Tractor Trailers	1	0	0	0	0	0	1
% Tractor Trailers	100	0	0	0	0	0	50



Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

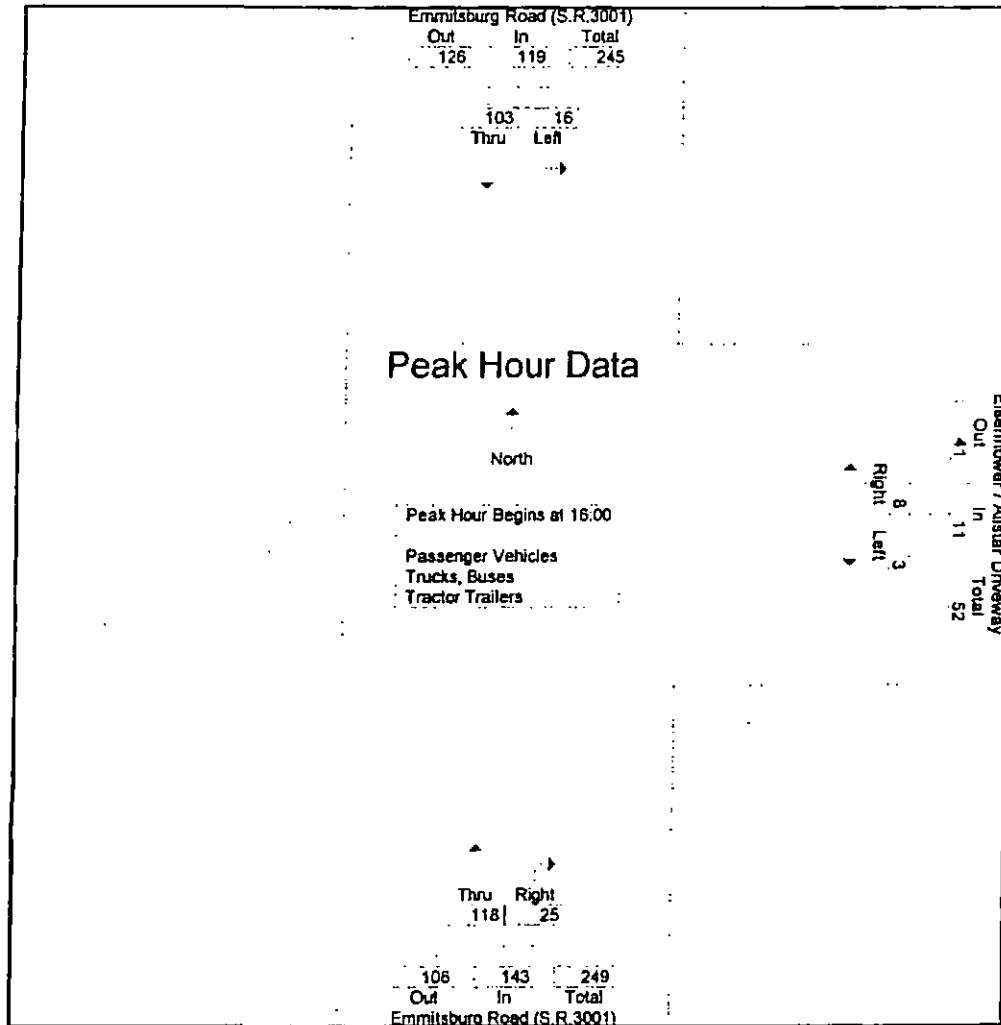
File Name : 3880112

Site Code : 03880102

Start Date : 1/15/2010

Page No : 2

Emmitsburg Road (S.R.3001)				Eisenhower / Allstar Driveway			Emmitsburg Road (S.R.3001)				Int. Total
Southbound				Westbound			Northbound				
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total		
Peak Hour Analysis From 16:00 to 18:45 - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 16:00											
16:00	18	3	21	1	1	2	5	31	36	59	
16:15	23	3	26	4	1	5	8	31	39	70	
16:30	30	2	32	1	0	1	8	33	41	74	
16:45	32	8	40	2	1	3	4	23	27	70	
Total Volume	103	16	119	8	3	11	25	118	143	273	
% App. Total	86.6	13.4		72.7	27.3		17.5	82.5			
PHF	.805	.500	.744	.500	.750	.550	.781	.894	.872	.922	





Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4660

Location: Emmitsburg Rd / Eisenhower Drw

Municipality: Cumberland Twp.

Day: Saturday

Counter: Steve

File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 1

Groups Printed- Passenger Vehicles - Trucks, Buses - Tractor Trailers

Emmitsburg Road (S.R.3001) Eisenhower / Allstar Driveway Emmitsburg Road (S.R.3001)

Southbound

Westbound

Northbound

Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
12:00	19	2	4	3	3	17	48
12:15	18	5	6	4	1	27	61
12:30	28	0	3	2	1	24	58
12:45	17	3	4	1	0	18	43
Total	82	10	17	10	5	86	210
13:00	35	3	2	6	2	23	71
13:15	27	3	2	2	2	17	53
13:30	33	0	4	0	3	14	54
13:45	22	5	2	1	1	32	63
Total	117	11	10	9	8	86	241
14:00	24	3	5	1	4	16	53
14:15	27	2	0	1	3	17	50
14:30	20	1	5	0	1	31	58
14:45	23	2	1	0	2	11	39
Total	94	8	11	2	10	75	200
Grand Total	293	29	38	21	23	247	651
Apprch %	91	9	64.4	35.6	8.5	91.5	
Total %	45	4.5	5.8	3.2	3.5	37.9	
Passenger Vehicles	292	29	38	21	23	247	650
% Passenger Vehicles	99.7	100	100	100	100	100	99.8
Trucks, Buses	1	0	0	0	0	0	1
% Trucks, Buses	0.3	0	0	0	0	0	0.2
Tractor Trailers	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0



Transportation Resource Group, Inc.

204 North George Street Suite 110

Location: Emmitsburg Rd / Eisenhower Drw

York, PA 17401

Municipality: Cumberland Twp.

(717) 846-4660

Day: Saturday

Counter: Steve

File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 1

Groups Printed- Trucks, Buses - Tractor Trailers

Start Time	Emmitsburg Road (S.R.3001)		Eisenhower / Allstar Driveway		Emmitsburg Road (S.R.3001)		Int. Total
	Southbound	Left	Westbound	Left	Northbound	Thru	
13:00	1	0	0	0	0	0	1
Total	1	0	0	0	0	0	1
Grand Total	1	0	0	0	0	0	1
Apprch %	100	0	0	0	0	0	
Total %	100	0	0	0	0	0	
Trucks, Buses	1	0	0	0	0	0	1
% Trucks, Buses	100	0	0	0	0	0	100
Tractor Trailers	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0



Transportation Resource Group, Inc.

204 North George Street Suite 110

York, PA 17401

(717) 846-4600

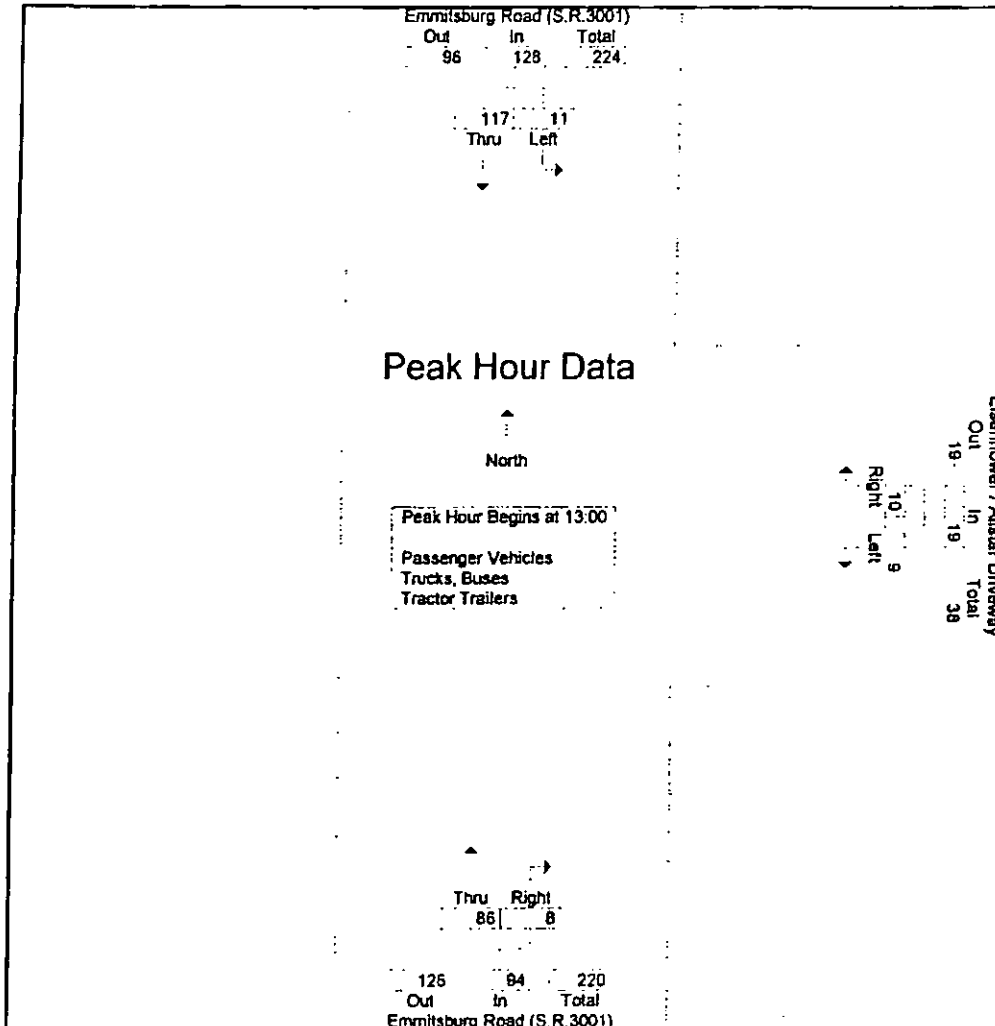
File Name : 3880113

Site Code : 03880103

Start Date : 1/16/2010

Page No : 2

	Emmitsburg Road (S.R.3001) Southbound			Eisenhower / Allstar Driveway Westbound			Emmitsburg Road (S.R.3001) Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 13:00										
13:00	35	3	38	2	6	8	2	23	25	71
13:15	27	3	30	2	2	4	2	17	19	53
13:30	33	0	33	4	0	4	3	14	17	54
13:45	22	5	27	2	1	3	1	32	33	63
Total Volume	117	11	128	10	9	19	8	86	94	241
% App. Total	91.4	8.6		52.6	47.4		8.5	91.5		
PHF	.836	.550	.842	.625	.375	.594	.667	.672	.712	.849





ject: Mason-Dixon Resort and Ca

Subject: Trip Distribution and Assignment

Job No. 388.01

Sheet No. 1 of 1

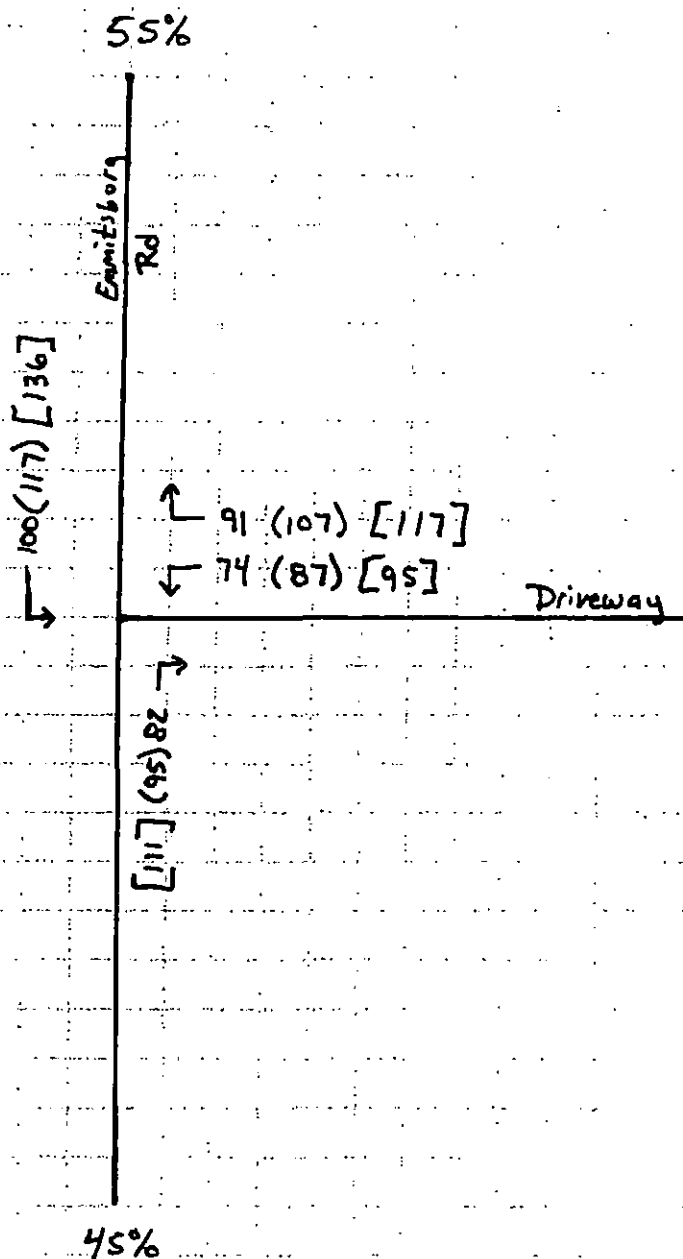
Computed By DJT

Date 1/27

Checked By

Date

204 N. George Street, Suite 110
York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858
www.consulttrg.com



000 (000) [0000] PM peak Thursday (PM peak Friday) [Saturday peak]

Table 355

Average Day of Week by Month Factors Compiled for Total Vehicles

The following 12 tables show average day of week factors by month compiled for total vehicles for the year 2008. Current year Automatic Traffic Recorder (ATR) traffic data is assembled and the data is placed in the respective TPG. Annual Average Daily Traffic (AADT) is tabulated individually for each of the 57 ATR stations. A factor is calculated for each day from each station and a list is tabulated by month and day of the week. This data is assembled by day and TPG for each station. The result is a group factor, which can be applied to a 24-hour raw traffic count taken during any day of the year to develop an AADT volume.

Seasonal Factor

January 2008										
DAY	TPG 1	TPG 2	TPG 3	TPG 4	TPG 5	TPG 6	TPG 7	TPG 8	TPG 9	TPG 10
Monday	1.130	1.289	1.102	1.167	1.142	1.264	1.151	1.231	1.155	1.288
Tuesday	1.093	1.297	0.989	1.125	1.078	1.229	1.112	1.191	1.083	1.243
Wednesday	1.060	1.316	0.987	1.120	1.072	1.205	1.076	1.196	1.080	1.330
Thursday	1.030	1.257	0.961	1.075	1.055	1.166	1.054	1.176	1.061	1.224
Friday	0.964	1.125	0.925	0.987	1.008	1.062	0.991	1.068	1.002	1.111
Saturday	1.320	1.429	1.284	1.311	1.208	1.443	1.219	1.299	1.275	1.216
Sunday	1.468	1.367	1.698	1.498	1.377	1.649	1.461	1.520	1.492	1.344
DAY OF MONTH	1.152	1.297	1.135	1.183	1.134	1.288	1.152	1.240	1.164	1.251

February 2008										
DAY	TPG 1	TPG 2	TPG 3	TPG 4	TPG 5	TPG 6	TPG 7	TPG 8	TPG 9	TPG 10
Monday	1.072	1.261	1.016	1.117	1.125	1.190	1.102	1.203	1.114	1.290
Tuesday	1.072	1.349	0.982	1.118	1.089	1.183	1.095	1.169	1.082	1.235
Wednesday	1.035	1.267	0.961	1.084	1.056	1.158	1.019	1.189	1.131	1.201
Thursday	0.992	1.194	0.927	1.035	1.039	1.089	1.029	1.108	1.042	1.192
Friday	0.946	1.094	0.899	0.952	1.010	1.005	0.975	1.052	1.029	0.910
Saturday	1.238	1.384	1.224	1.227	1.171	1.312	1.187	1.252	1.239	1.158
Sunday	1.349	1.324	1.543	1.491	1.348	1.523	1.389	1.501	1.488	1.476
DAY OF MONTH	1.101	1.267	1.079	1.146	1.120	1.209	1.114	1.210	1.160	1.209

TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic Signal Warrant
Analysis

WARRANT 9, ADT VOLUME WARRANT EVALUATION

PennDOT Publication 212.302.b (3) (ii)

CONDITION A -- ADT VOLUME WARRANT					
Number of Lanes for Moving Traffic on Each Approach		Estimated ADT*			
Major Street	Minor Street	Major Street (Both Approaches)		Higher Volume Minor Street (One Direction Only)	
		100%	70%**	100%	70%**
1	1	10,000	7,000	3,000	2,100
2 or more	1	12,000	8,400	3,000	2,100
2 or more	2 or more	12,000	8,400	4,000	2,800
1	2 or more	10,000	7,000	4,000	2,800

CONDITION B -- ADT VOLUME WARRANT					
Number of Lanes for Moving Traffic on Each Approach		Estimated ADT*			
Major Street	Minor Street	Major Street (Both Approaches)		Higher Volume Minor Street (One Direction Only)	
		100%	70%**	100%	70%**
1	1	15,000	10,500	1,500	1,050
2 or more	1	18,000	12,600	1,500	1,050
2 or more	2 or more	18,000	12,600	2,000	1,400
1	2 or more	15,000	10,500	2,000	1,400

* Based on the volume projected to be present within 6 months of the opening of the development or within 2 years of the opening of the highway.

** May be used if the 85th percentile speed of the major street traffic exceeds 40 miles per hour or the intersection lies within the built-up area of an isolated community having a population of less than 10,000.

Proposed Site Traffic for Proposed Casino:

ADT for entire development assuming full-build out: 7020
 Exiting ADT for proposed casino: $7020 / 2 = 3510$ exiting
 Existing exiting ADT on driveway: 212 trips
 Total ADT exiting driveway: $3510 + 212 = 3722$ trips

ADT on Emmitsburg Road:

ADT on Emmitsburg Road: 2171
 ADT entering from proposed casino: 3510
 Total ADT on Emmitsburg Road: 5681

Based on the minimum ADT volumes shown in the Table for Condition A, the minimum ADT volumes are not met to satisfy Traffic Signal Warrant 9.

Based on the minimum ADT volumes shown in the Table for Condition B, the minimum ADT volumes are not met to satisfy Traffic Signal Warrant 9.

Peak Hour Signal Warrant

MUTCD Warrant 3 - Peak Hour (70% Factor)

Based on MUTCD Sect. 4C.04 Signal Warrants and PENNDOT Publication 212

General Information

Project Number: 388.01

Location: Emmitsburg Rd / Complex Driveway

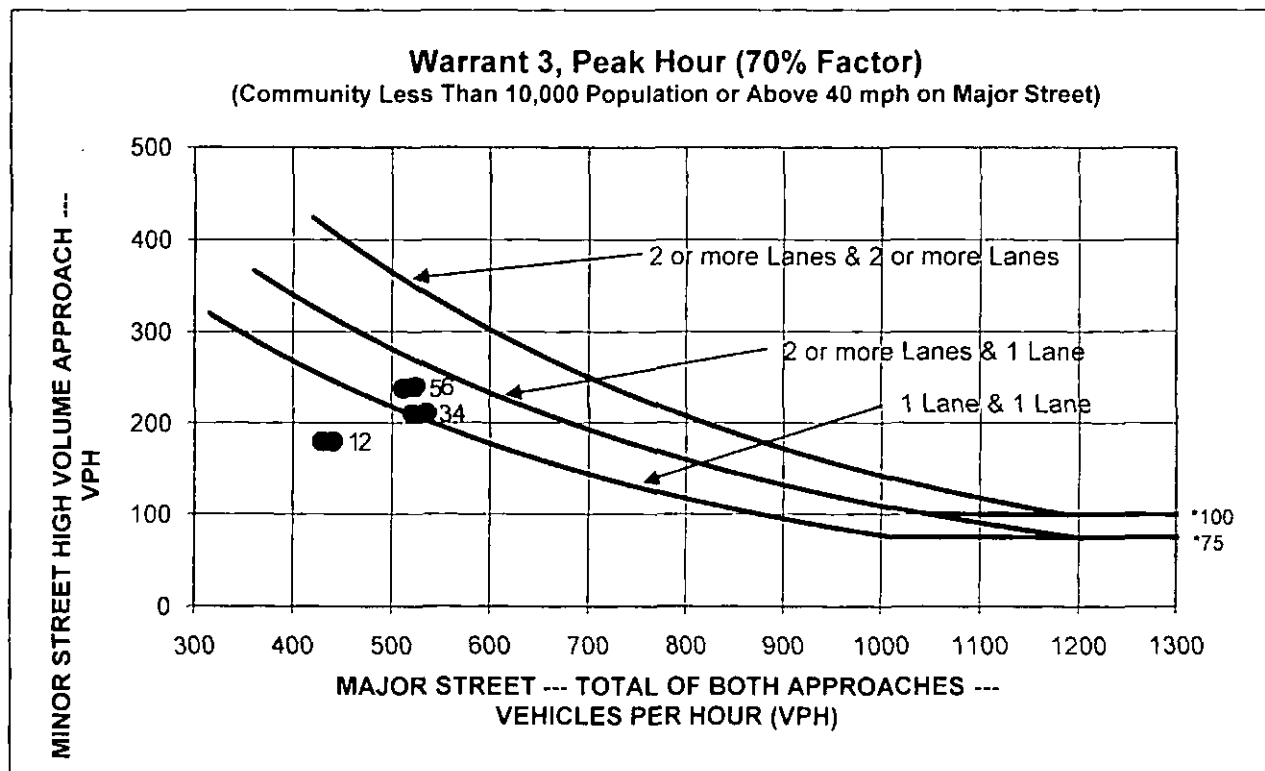
Performed By: DJT

of Major Street Lanes: 1 Lane

of Minor Street Lanes: 1 Lane

Analysis Details

Scenario / Peak Hour		PHV Major Street	PHV Minor Street	Warrant Met?
1	2012 Traffic Volumes w/ Dev - PM (Thurs)	429	180	No
2	2017 Traffic Volumes w/ Dev - PM (Thurs)	440	180	No
3	2012 Traffic Volumes w/ Dev - PM (Fri)	521	210	Yes
4	2017 Traffic Volumes w/ Dev - PM (Fri)	535	211	Yes
5	2012 Traffic Volumes w/ Dev - Sat	512	238	Yes
6	2017 traffic Volumes w/ Dev - Sat	524	240	Yes



* Note

100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane



204 North George Street, Suite 110 • York, PA 17401-1108
T: (717) 846-4660 • F: (717) 846-4858 • www.consulttrg.com



Transportation Resource Group, Inc.

204 North George Street, Suite 110

York, PA 17401-1108

T: (717) 846-4660 • F: (717) 846-4858

www.consulttrg.com

ADVANTAGE ENGINEERS

June 18th, 2010

Mr. Bernard A. Yannetti, Jr., Esq.
HARTMAN & YANNETTI
126 Baltimore Street
Gettysburg, PA 17325

RE: Results of Shriver Well Evaluation
Cumberland Township, Adams County, Pennsylvania
Advantage Project No.: 1002004

Dear Mr. Yannetti:

This letter provides the results of the evaluation performed by Advantage Engineers, LLC (Advantage) of the Shriver well. The purpose of the evaluation was to determine if the quantity and quality of groundwater available from this well was suitable for use as the source for the proposed Mason Dixon development.

Background

Advantage completed an evaluation of the existing Timeless Towns potable water system at the Eisenhower Inn and Conference Center. Those findings indicated that the existing groundwater-supplied system would have a deficit of approximately 25,000 gallons per day (gpd) if the Mason Dixon facility was added. The Shriver property is located on the west side of Emmitsburg Pike, and has an existing 6-inch diameter well constructed in the Gettysburg Formation, which is substantially more productive than the Diabase bedrock which serves as the aquifer for the Timeless Towns supply wells. Figures 1 and 2 (Attachment 1) show the Shriver well and surrounding area on a topographic map and recent aerial photograph. Figure 2 includes the mapped contact between the Gettysburg Formation and Diabase.

The groundwater in the area of the Eisenhower Inn was impacted by buried foundry waste that included metals and salts, and resulted in excess concentrations of some metals, nitrate, and Total Dissolved Solids (TDS) in some of the Timeless Towns supply wells. The impact appears to be contained within the Diabase bedrock aquifer.

The Shriver well is a 6-inch diameter open borehole bedrock test well (i.e., not permanently constructed for public water supply use), with a total depth of 200 feet that was drilled in February 1996. The yield was estimated at 100 gallons per minute (gpm) by the driller based on the blown yield (see Drillers Log, Attachment 2). Based on the drillers log, all of the water enters the borehole at single water bearing zone (WBZ) located 178 feet below grade. A water quality test of groundwater from the Shriver well for various metals and other inorganic compounds performed by PADEP in May 2000 showed elevated concentrations of iron, calcium, magnesium, and manganese (see Attachment 2); it is feasible that these elements may represent natural conditions, or reflect some impact from the foundry.

telecommunications / environmental / geotechnical

910 Century Drive, Mechanicsburg, Pennsylvania 17055
(717) 458-0800 (717) 458-0801(fax)

Shriver Well Capacity

Well Pumping

The Shriver well capacity was determined by performing a pumping test and monitoring the well response. A temporary submersible pump was installed that was capable of delivering 100 gpm against a total dynamic head pressure of 120 feet. The pump intake was set at approximately 167 feet below top of casing (toc). The discharge included a flow control valve, totalizing meter, sampling port, and sufficient discharge hose to convey the water 400 feet away from the well head to preclude any recirculation. A drop pipe was also installed to enable placement of an electronic datalogger to record the water level in the well. A second datalogger was placed in a nearby, off-site domestic well in order to evaluate potential well interference.

The pump was installed in the Shriver well on June 1, 2010, and pumping was initiated at 12:08. The initial static water level (SWL) was 17.33 feet below toc. A step drawdown test was conducted, which consists of beginning pumping at a low rate, and progressively increasing the rate after 30 to 60 minutes of pumping. The pumping was extended after the step drawdown test for a total duration of 1,460 minutes (24.3 hours).

The initial pumping rate was 35.3 gallons per minute (gpm), and was followed by rates of 49.2 gpm and 84.4 gpm. Following the last step, the rate was decreased several times in order to determine a rate that would maintain the pumping water level (PWL) above the WBZ at 178 feet for an extended period of time. After 24 hours water quality samples were collected and the pumping was stopped and the well was permitted to recover. The water level monitoring continued for 2 more days. An electronic copy of the datalogger files for the Shriver well and the observation well are provided in Attachment 3.

Step Drawdown Test Result

A summary of the step drawdown test is as follows:

Table 1 – Shriver Well Step Drawdown Test Summary

Rate (Q)	Initial Water level	Final Water Level	Net Drawdown (Sw)	Specific Capacity (Q/Sw)	Specific Drawdown (Sw/Q)
(gpm)	Feet Below TOC	Feet Below TOC	Feet	gpm/foot	feet/gpm
35.4	17.52	45.98	28.46	1.24	0.80
49.2	45.98	88.48	70.96	0.69	1.44
84.4	88.48	150.00	132.48	0.64	1.57

One purpose of the step drawdown test is to evaluate the laminar and turbulent flow components of the total drawdown in the well. A well borehole with a high turbulent flow component may benefit from increasing the diameter, which often reduces turbulent flow and permits the well to be pumped at a higher rate. Figure 3 portrays the Turbulent Flow Analysis for the Shriver well (as shown, it relies on the last 2 pumping steps because they had the same duration). The analysis indicates that at a pumping rate of 50 gpm, the turbulent flow accounts for approximately 12% of the borehole drawdown. Therefore, most of the drawdown observed in the borehole is attributed to actual aquifer

drawdown. This finding was reflected in the well recovery after pumping stopped. Based on these findings, increasing the borehole would not significantly reduce the drawdown due to turbulent flow, and would probably not result in the ability to pump the well at a higher rate.

Extended Pumping Results

The extended pumping after the step drawdown was used to estimate a sustainable long term pumping rate, i.e., a rate that would preclude the pumping water level (PWL) from declining below the WBZ at 178 feet after continuous pumping for 3 to 6 months. Figure 4 portrays the well response to the step drawdown and extended pumping on a semi-logarithmic plot, which is useful for estimating long-term well performance. Rate reductions were made after the third pumping step to preclude lowering the PWL to the pump intake, but the PWL still declined to the intake. The last reduction to 45 gpm is labeled on Figure 4, and includes a trend projection to the WBZ at 178 feet, which would occur after only 3.5 days of continuous pumping. As previously stated, a long-term sustainable pumping rate should maintain the PWL above the WBZ; otherwise, there is risk of permanent loss of well yield due to mineral encrustation and fracture dewatering, and possible water quality issues due to cascading water (e.g., iron bacteria).

Figure 4 shows the PWL trend for the initial step drawdown rate of 35.5 gpm projected to the WBZ at 178 feet. The projection indicates that the PWL would not reach the WBZ for approximately 140 days of continuous pumping and no recharge to the aquifer, and therefore this rate would be considered to be sustainable. It should be noted that there is a large degree of uncertainty with such a long term projection of a short period of pumping.

The transmissivity of the aquifer was estimated using the Cooper Jacob Method¹ and the straight line segment from the initial rate of 35.5 gpm. Typically, the transmissivity from the initial aquifer response is most representative. The calculated transmissivity was 280 gallons per day/foot, which converts to 40 feet²/day. Assuming that the saturated interval of the borehole (i.e., 163 feet) approximates the aquifer thickness, the hydraulic conductivity is 0.2 feet/day. These values are somewhat low for a bedrock aquifer, and only considered to be approximate and subject to uncertainty. This is because the fractured bedrock setting does not meet all of the hydraulic conditions for the Cooper Jacob Method assumptions, such as an infinite and homogenous isotropic aquifer. However, it provides an approximation of the bedrock aquifer conditions.

Well Recovery

Figure 5 is a semi logarithmic plot of the well recovery following the Theis Method². What is noteworthy is the very slow recovery, which represents the amount of time required for the aquifer to return to the pre-pumping conditions. Typically, the recovery is acceptable if the water level returns to 90% of the pre-pumping water level within about 24 hours. In this instance, the well only recovered to 83% after 2 days, which is considered quite slow. The slow recovery is attributed to the

¹ Cooper, H. and Jacob, C., 1946, A generalized graphical method for evaluating formation constants and summarizing well-field history, Transactions of the American Geophysical Union, Vol. 27, pp. 526-534.

² Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophysical Union Trans., vol. 16, pp. 519-524.

presence of the diabase bedrock, which functions similar to an impermeable wall. Therefore, effective aquifer recovery is limited to the conditions to the west of the Shriver well. This condition must be accounted for when evaluating the long-term production from the well, and indicates that if the well is over-pumped it would require several days or more of recovery to restore the yield.

The recovery also shows that the drawdown in the well very nearly matched the aquifer drawdown outside of the well. As can be seen, instead of an initial, rapid rise in the borehole followed by considerable slowing (when the aquifer drawdown is reflected by the well recovery), the recovery started slowly and continued as such.

Observation Well Response

A domestic well located at 2812 Emmitsburg Pike was used for aquifer observation during the Shriver well pumping. This well is located approximately 800 feet towards the east-northeast (see Figure 2). This location is oriented in the general direction of bedrock strike for the Gettysburg Formation, which is a preferential direction for aquifer drawdown to develop from a pumping well. An electronic datalogger automatically recorded the water level on a 10-minute frequency, and this data is shown on Figure 6, which is a hydrograph for the period of pumping and recovery at the Shriver well. There was no discernable change to the water level at the observation well, and based on this result, it is unlikely that groundwater withdrawals from the Shriver well would have any significant effect to this or any of the other existing wells in the vicinity of the Shriver well.

Summary of Shriver Well Capacity Testing

Based on the pumping and recovery responses, it is likely that the Shriver well in its current state could produce a maximum of 30 to 35 gpm on a regular basis. This withdrawal would provide between approximately 43,000 to 50,000 gallons per day (gpd). Due to the limitations to the aquifer recovery, this well could not be relied on as the sole source of potable water for the Mason Dixon development, which is expected to require 48,000 gpd during peak periods.

It is likely that deepening the well to at least 500 feet would intersect one or more additional WBZs. This would increase the hydraulic communication with the aquifer, and the sustainable production from the well.

Groundwater Quality

The end of pumping groundwater samples were submitted to Analytical Laboratory Services, Inc. (ALSI) and analyzed for the following parameters:

- Volatile and Semivolatile Organic Compounds (VOCs and SVOCs)
- Selected Metals
- TDS
- Nitrate
- Sulfate
- Bacteria

Most of these parameters have either a Primary or Secondary Drinking Water Standard (DWS), with Primary standards based on health risks, and secondary standards based on aesthetics (taste, odor, and/or staining). An exceedance of either a Primary or Secondary standard would require some form

of treatment for use by a public water system (such as the Mason Dixon development). A copy of the analytical report is provided in Attachment 4, and a summary of the results is as follows:

- **SVOCs** – none were detected
- **VOCs** – none were detected, except for trace toluene at 3.8 parts per billion. The Primary DWS for toluene is 1,000 parts per billion, so the concentration is far below the DWS and requires no action. The source of the toluene cannot be determined, but it may be a false positive due to cross-contamination at the laboratory.
- **TDS** – the concentration was 323 milligrams per liter (mg/L), and below the Secondary DWS of 500 mg/L. These are considered moderately elevated, but require no treatment.
- **Nitrate** – the concentration was 2 mg/L, which is substantially below the 10 mg/L Primary DWS. Nitrate is often sourced from agriculture fertilizer, and at the Timeless Towns wells has been linked to the Gettysburg Foundry issue. However, this concentration is considered very low and does not warrant any action.
- **Sulfate** – the concentration was 30.5 mg/L, and is within a typical range for natural levels in a bedrock aquifer
- **Turbidity** – was 1.56 nephelometric turbidity units (NTU); unfiltered groundwater should have turbidity below 5 NTU, so this result warrants no action. Turbidity typically declines to <1 NTU after a well is regularly operated.
- **Metals** – a total of 15 metals were analyzed for in the sample; most of the metals were previously detected in environmental samples collected at the Gettysburg foundry site. Most of these metals were not detected in the sample, except for the following (with applicable standard in parenthesis):

Aluminum – 0.19 mg/L (secondary DWS is 0.2 mg/L)
Copper – 0.0068 mg/L
Iron – 0.13 mg/L (secondary DWS is 0.3 mg/L)
Lead – 0.0023 mg/L
Manganese – 0.0055 mg/L (secondary DWS is 0.05 mg/L)
Vanadium – 0.011 mg/L (Act 2 Residential GW is 0.26 mg/L)
Zinc – 0.0073 mg/L (secondary DWS is 5.0 mg/L)

These metal results are within the typical range of concentrations for groundwater sourced from a bedrock aquifer, with the exception of vanadium which is typically not analyzed for in a drinking water sample. Excluding vanadium, each of the detected metals was not present at a significant concentration. The aluminum was just below the Secondary DWS, but it is likely that the aluminum, as well all of the detected metal concentrations, would decrease with regular pumping, since residual, suspended mineral matter from the well drilling can result in the presence of some metals.

The vanadium concentration is substantially lower than the PADEP Act 2 limit for residential exposure. Act 2 includes environmental cleanup standards for soil and groundwater. Although these standards are not usually applied to drinking water, they provide some framework for concluding that the detected vanadium concentration is low, and does not warrant any further action. It is probable that the vanadium is naturally occurring.

Overall, the water quality results indicate that the groundwater from the Shriver well is of good quality, and would likely not require treatment except for simple disinfection, and possibly iron and manganese, as these are common constituents in groundwater sourced from the Gettysburg

Formation. There was no evidence that the groundwater was impacted by the various issues associated with the Gettysburg Foundry.

Recommendations

In order to develop a sustainable source for a public water system to service the proposed Mason Dixon development, Advantage recommends the following actions:

1. Deepen the Shriver well to determine whether the sustainable pumping rate can be increased.
2. Drill a second supply well at the Shriver property at a location further west and south. A second well is necessary for the system in order to preclude over pumping and to ensure the long-term sustainability of the water supply. If a second well is not constructed, the existing Timeless Towns wells will be required to remain in service as a back up source.
3. Any well used for the proposed development must be reconstructed to meet PADEP requirements for a public water supply well, including permanent casing adequately seated in bedrock with full annular space grouting.

Advantage appreciates the opportunity to assist you on this project. Should you have any questions regarding this evaluation or if we may be of further assistance, please do not hesitate to contact us at 717 458-0800.



Very truly yours,
ADVANTAGE ENGINEERS

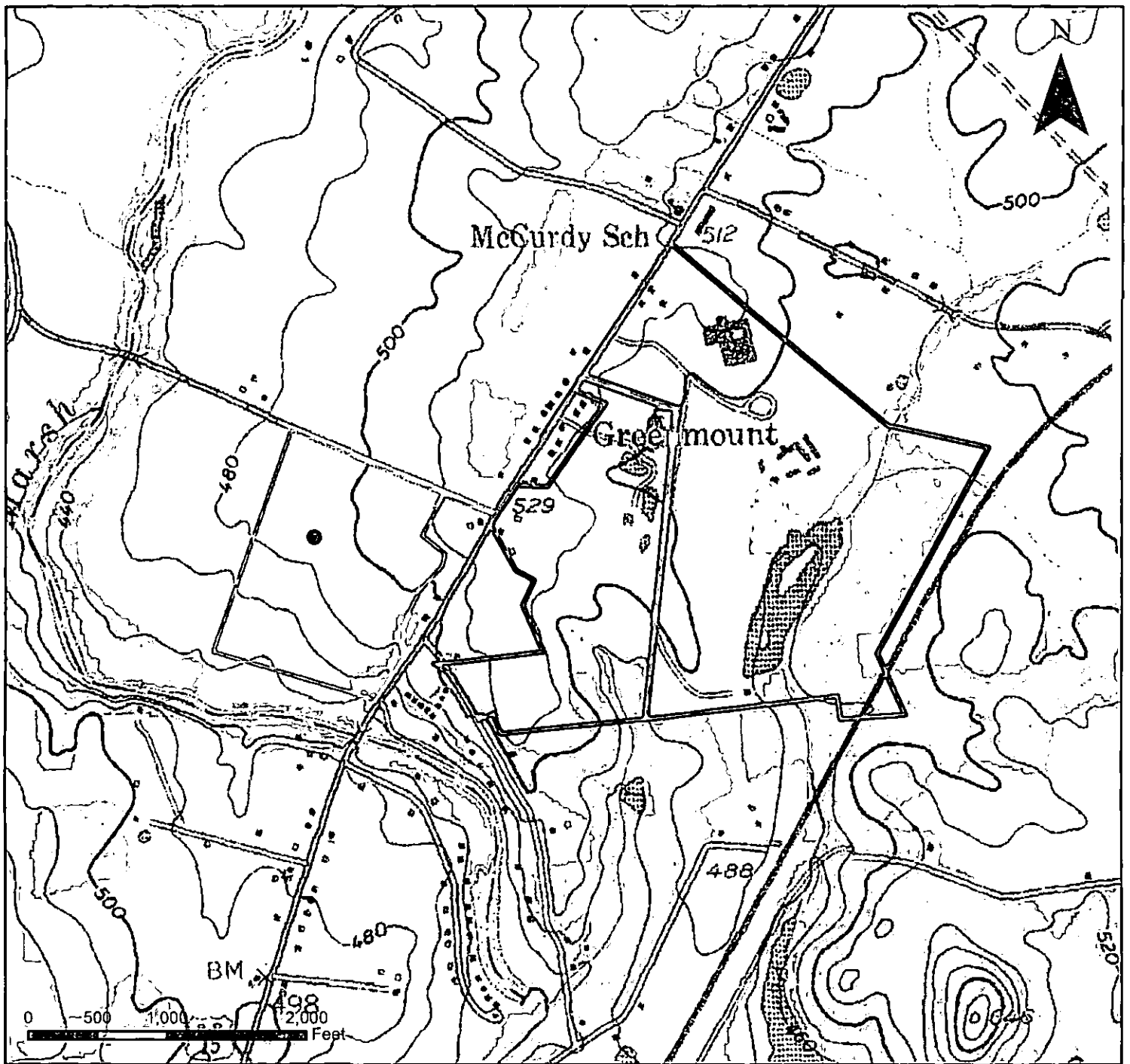
Steven R. Read, P.G.
Senior Hydrogeologist

Edward L. Balsavage, P.E.
Principal

Attachments 1 through 4

ATTACHMENT 1

Figures







**Figure 1 - USGS Topographic Map
Fairfield PA, 7.5 Minute Quadrangle**

**ADVANTAGE
ENGINEERS**

Timeless Towns of America Site

Cumberland Township
Adams County, Pennsylvania

Advantage Project #: 100200401
June 2010

-  Subject Property
-  Gettysburg Foundry Property
-  Shriver Property
-  Shriver Well

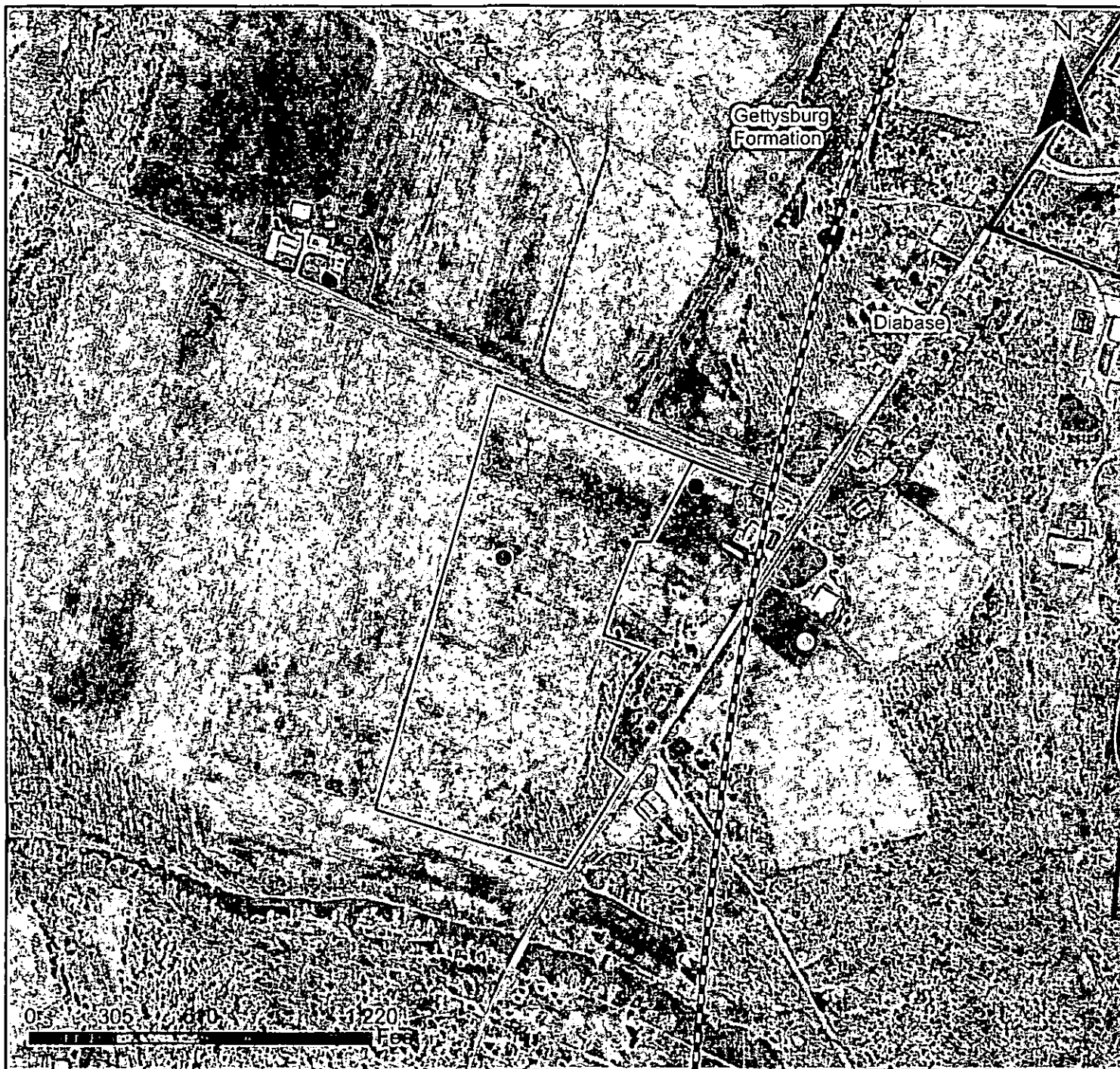


Figure 2 - Aerial Photograph
2003 PASDA Aerial Photography

**ADVANTAGE
ENGINEERS**

Shriver Well

Cumberland Township
Adams County, Pennsylvania

Advantage Project #: 100200401
June 2010



Subject Property



Shriver Property



Shriver Well



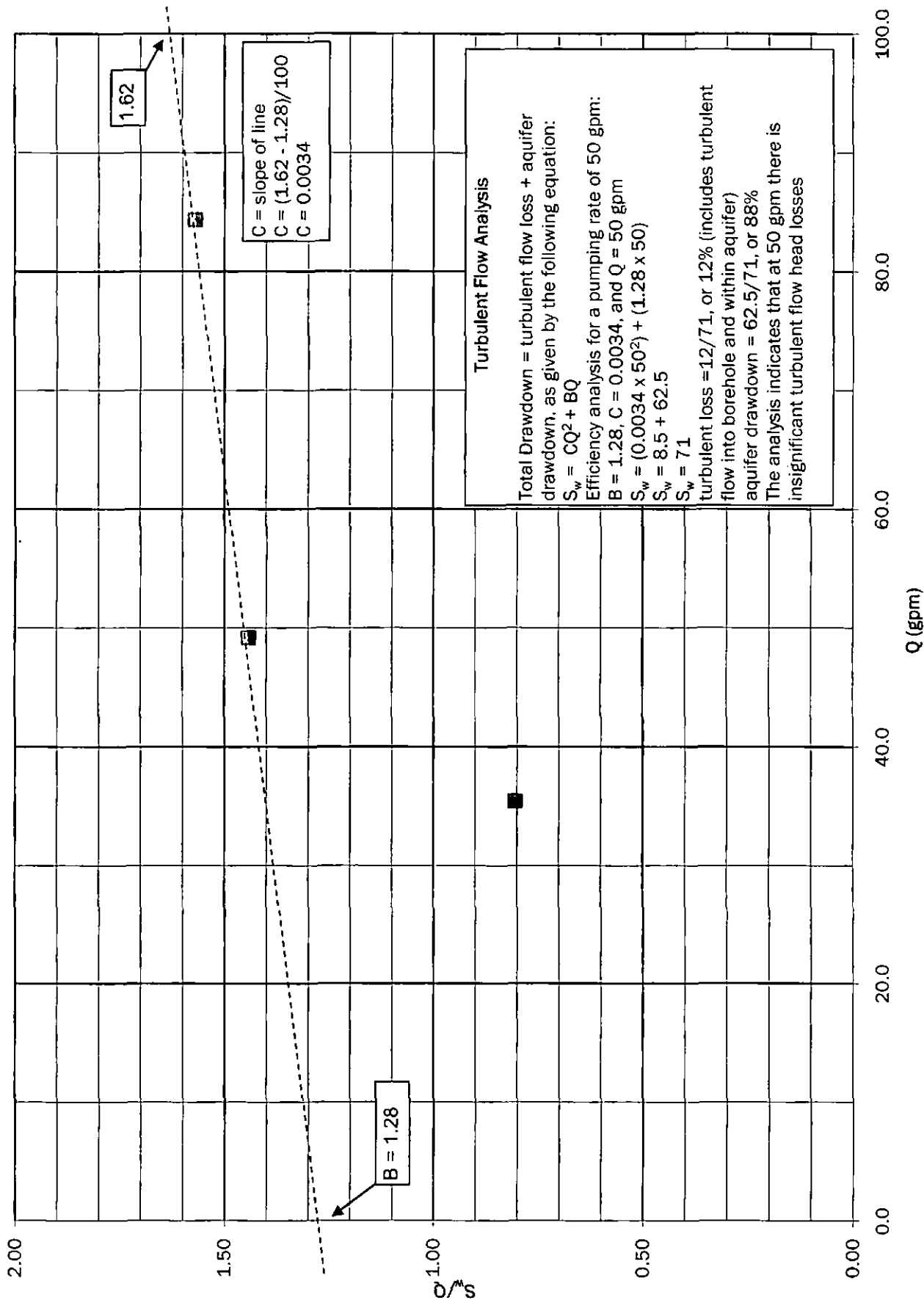
Observation Well



Geologic Contact

Shriver Well Turbulent Flow Analysis

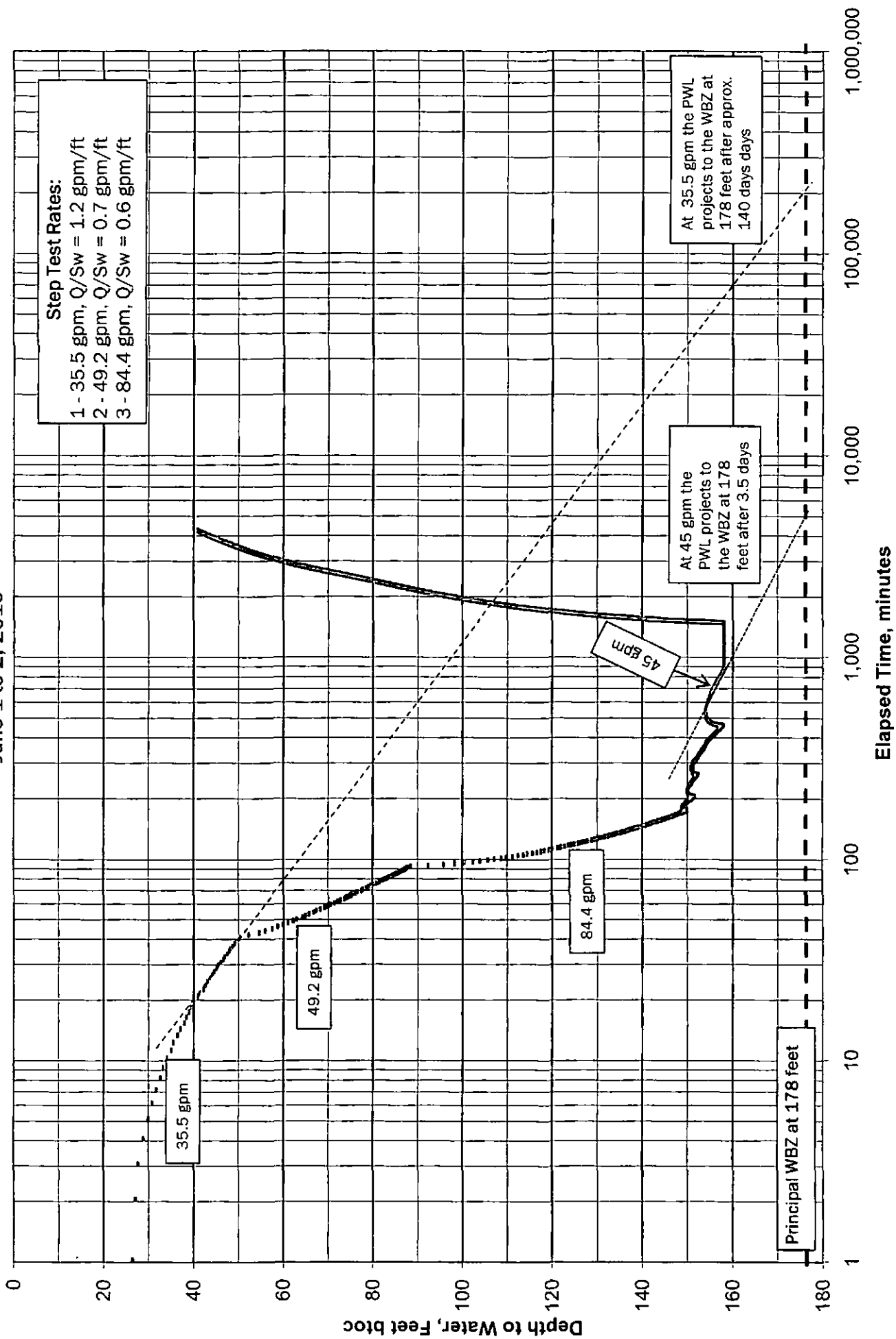
Figure 3



Shriver Well Semilog Plot

June 1 to 2, 2010

Figure 4



Shriver Well Residual Drawdown

June 2 to 4, 2010

Figure 5

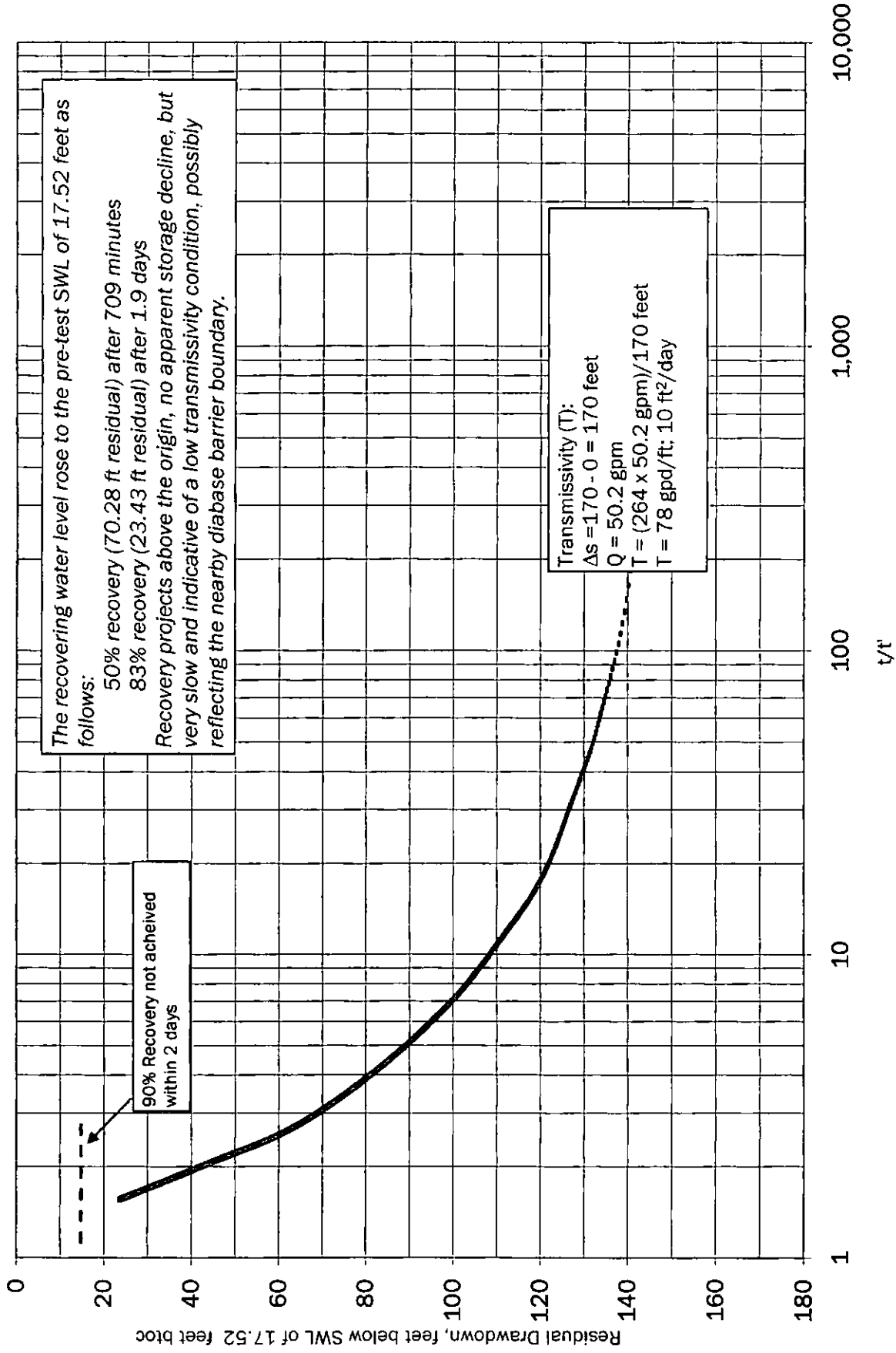
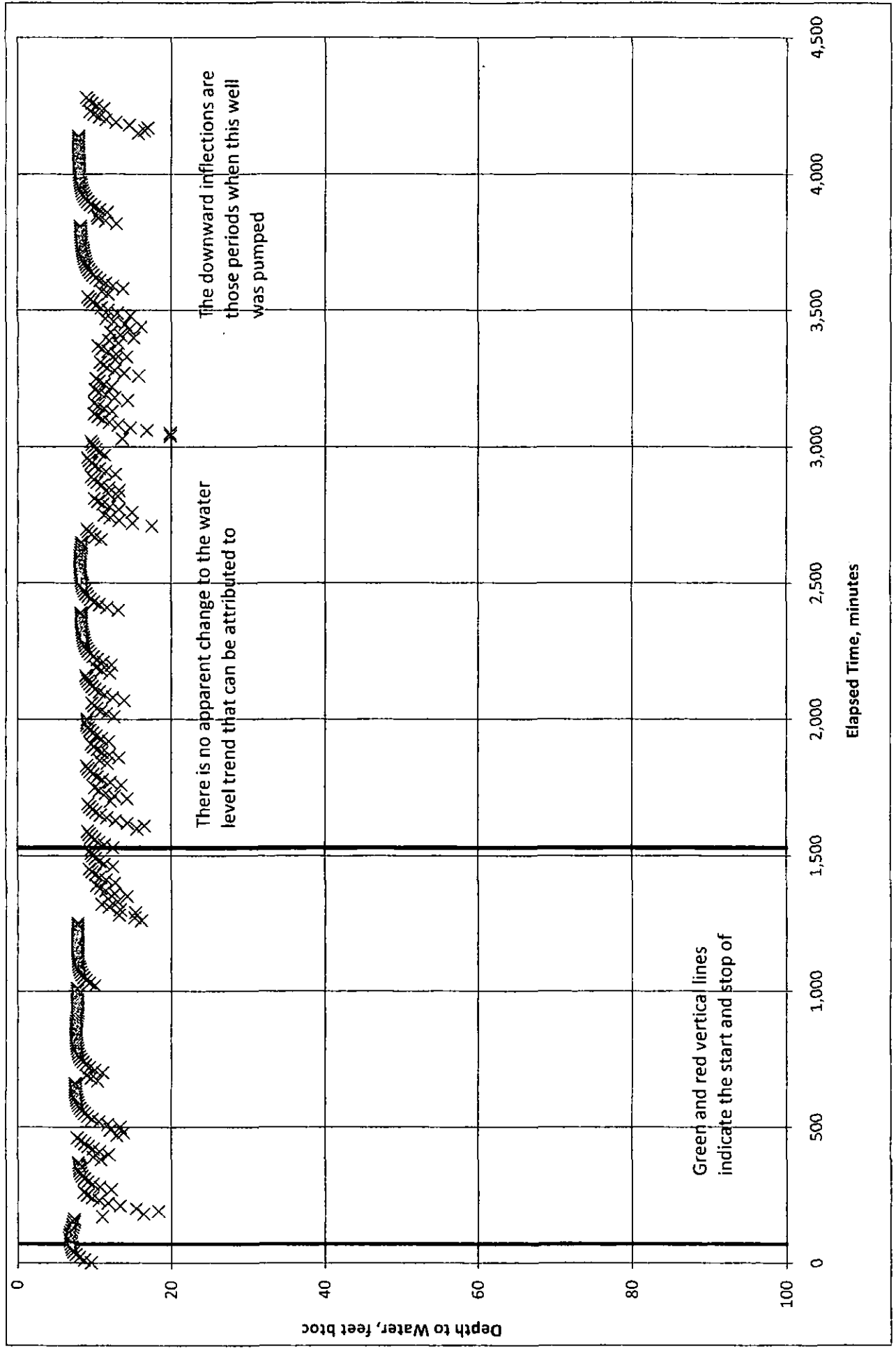


Figure 6

Observation Well Hydrograph
2812 Emmitsburg Road
June 1 to 3, 2010



ATTACHMENT 2

Shriver Well Background Information

(See Reverse for Explanation)

Department of Conservation and Natural Resources

WATER WELL COMPLETION REPORT
Use Ball Point Pen, Press Firmly and Print Clearly
(DO NOT WRITE IN GRAY COLORED BLOCK)

Water Well Drillers Licensing
PO Box 8453, Harrisburg, PA 17105-8453
717-787-5028

SL 42 E Lat Long Sec Arc
Topo Section Aquifer Rock Type
State Hydrologic Unit
Map Well

Well Site

Township/County Cumberland Adams
Address Cunningham Rd
Owner last name Shriver first name Ernie
Driller Alexander PA Lic# 1665
Date Drilled 2-19-96
Well: 200 depth (ft) 6 dia (in) Will be
Total Casing(1) 42 length (ft) 6 dia (in) steel grouted
Total Casing(2) 17.8 length (ft) 6 dia (in) steel grouted
Depth to bedrock 10 ft.
Saltwater zone 0 ft.
Water-bearing zones 1) 17.8 2) 10
Water levels: 20 ft (static) 30 ft (after test) 10 ft (drawdown)
Yield 100 gallons per minute (GPM)
Yield Method: bucket drill est. pump
Length of pump test: 2 hr min

I hereby certify that the above information is true and complete to the best of my knowledge and belief

Russell alb 2/19/96
Driller's Signature (required) Date

(Circle Appropriate Answer)
Well Type: water supply, injection, monitoring, heat pump, test
Water Use: residence, public, stock, irrigation, institutional, industrial, other
Well Finish: open hole, open end, screen, perforated casing
Length of screen or perforated casing _____ ft.
Drilling method: cable, air rotary, auger, other
Landform at site: hilltop, valley, hillside, other
Abandoned: No Yes/Why: _____
Written directions to well site: From Gettysburg
Turn Right on Cunningham
Well on Left

Development: _____ Name _____
Lot _____
Local Well # _____
DER Permit # _____

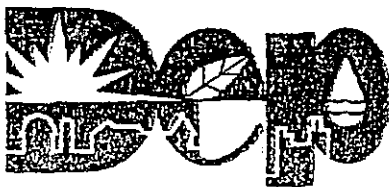
(Sketch Map)

W N E
Cunningham Rd
Bus Rt 15
Xwell
Marsh Creek Rd
If this portion is traced, please give source.
Indicate route numbers, intersections, schools, churches, cemeteries, streams, towns and any notable feature such as quarries, bridges, railroads, etc. Be sure to show distances between these features (miles/feet)

WELL DRILLER

8700-FM-TGS50015 Rev. 5/95

2/19/10 owner's comments: E.R. SHRIVER
The 6" dia. well is for a single family. Produced 100 gal/min.
Driller recommends re-drill with an 8" drill bit.
(Same well - to increase yield.)
Also, drill additional 2 wells.
It is shale ground (not diabase.) see Geology Map
Indicates good water supply.
100 gal./min. = 140,000 gal/day



Pennsylvania Department of Environmental Protection

909 Elmerton Avenue
Harrisburg, PA 17110-8200
July 25, 2000

Southcentral Regional Office

717-705-4705
FAX 717-705-4830

Ernest Shriver
344 Gordon Road
Fairfield, PA 17320

Dear Ernest Shriver:

As you recall, personnel from the Department sampled your well during the week of May 22-26, 2000. The water was analyzed for inorganic compounds (metals) as well as nitrates, chlorides, and TDS (total dissolved solids). Enclosed are the results of that sampling event. The results show that none of the compounds detected exceed Pennsylvania drinking water standards.

If you have any questions on these results, please contact me at 717-705-4833.

Sincerely,

Ruth Bishop

Ruth Bishop
Environmental Chemist
Environmental Cleanup Program

Enclosure





Lancaster Laboratories Sample No. WW 3388547

Collected: 05/25/2000 10:15 by RB

Account Number: 06195

Submitted: 05/26/2000 14:20

Reported: 06/22/00 at 03:02 PM

Discard: 6/30/00

00517 Grab Water Sample

PA Dept. of Env. Protection
Rachel Carson Off. Bldg. 14th F
PO Box 8471
Harrisburg PA 17105-8471SITE ID: 3-527 SAMPLE ID: 00517
PA

00517 SDG#: PAE28-01

CAT No.	Analysis Name	CAS Number	As Received	As Received	Units	Dilution
			Result	Limit of Quantitation		
00259	Mercury	7439-97-6	< 0.00020	0.00020	mg/l	1
01743	Aluminum	7429-90-5	< 0.200	0.200	mg/l	1
01744	Antimony	7440-36-0	< 0.200	0.200	mg/l	1
01746	Barium	7440-39-3	< 0.100	0.100	mg/l	1
01747	Beryllium	7440-41-7	< 0.0100	0.0100	mg/l	1
01749	Cadmium	7440-43-9	< 0.0100	0.0100	mg/l	1
01750	Calcium	7440-70-2	60.6	0.200	mg/l	1
01751	Chromium	7440-47-3	< 0.0300	0.0300	mg/l	1
01752	Cobalt	7440-48-4	< 0.0500	0.0500	mg/l	1
01753	Copper	7440-50-8	< 0.0250	0.0250	mg/l	1
01754	Iron	7439-89-6	5.64	0.100	mg/l	1
01757	Magnesium	7439-95-4	22.9	0.100	mg/l	1
01758	Manganese	7439-96-5	0.0458	0.0100	mg/l	1
01761	Nickel	7440-02-0	< 0.0500	0.0500	mg/l	1
01762	Potassium	7440-09-7	2.47	0.500	mg/l	1
01766	Silver	7440-22-4	< 0.0200	0.0200	mg/l	1
01767	Sodium	7440-23-5	9.48	0.600	mg/l	1
01771	Vanadium	7440-62-2	< 0.0200	0.0200	mg/l	1
01772	Zinc	7440-66-6	< 0.0250	0.0250	mg/l	1
07022	Thallium TR	7440-28-0	< 0.0200	0.0200	mg/l	1
07035	Arsenic TR	7440-38-2	< 0.0100	0.0100	mg/l	1
07036	Selenium TR	7782-49-2	< 0.0100	0.0100	mg/l	1
07055	Lead TR	7439-92-1	< 0.0200	0.0200	mg/l	1
00212	71.5 Total Dissolved Solids	n.a.	317.	30.	mg/l	1
01124	70.9 Chloride (titrimetric)	16887-00-6	14.9	1.0	mg/l	1
07882	72.3 Total Nitrite/Nitrate	7727-37-9	2.04	0.10	mg/l	1
08255	30.5 Total Cyanide (water)	57-12-5	< 0.0050	0.0050	mg/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Analysis		Analyst	Dilution Factor
			Trial#	Date and Time		
00259	Mercury	SW-846 7470A	1	06/14/2000 11:47	Rosalind D. Ernest	1

Lancaster Laboratories
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717-656-2300 Fax: 717-656-2681Lancaster Laboratories is a subsidiary of Thermo TerraTech Inc., a Thermo Electron Company.
See reverse side for explanation of symbols and abbreviations.

ATTACHMENT 3

Datalogger Files

ATTACHMENT 4

Analytical Report



**ANALYTICAL
LABORATORY
SERVICES, INC.**

www.analyticalab.com
NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

Certificate of Analysis

Project Name:	POTENTIAL PWS WELL-PA SITE	Workorder:	9847808
Purchase Order:		Workorder ID:	Shriver Well

Mr. Steven Read
Advantage Engineers
910 Century Drive
Mechanicsburg, PA 17055

June 17, 2010

Dear Mr. Read,

Enclosed are the analytical results for samples received by the laboratory on Wednesday, June 02, 2010

ALSI is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Susan Baer (Project Coordinator) or Anna G Milliken (Laboratory Manager) at (717) 944-5541.

Please visit us at www.analyticalab.com for a listing of ALSI's NELAP accreditations and Scope of Work, as well as other links to Water Quality documentation on the internet.

This laboratory report may not be reproduced, except in full, without the written approval of ALSI.

NOTE: ALSI has changed the report generation tool and while we have tried to retain the existing format, you will notice some changes in the laboratory report. Please feel free to contact ALSI in case you have any questions.

Analytical Laboratory Services, Inc.

CC: Mr. Pierre Macoy

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.


Anna G Milliken
Laboratory Manager



**ANALYTICAL
LABORATORY
SERVICES, INC.**

www.analyticallab.com
NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1450

SAMPLE SUMMARY

Workorder: 9847808 Shriver Well

Discard Date: 07/01/2010

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
9847808001	Pumping Well	Water	6/2/10 12:30	6/2/10 14:26	Pierre Macoy

Workorder Comments:

Notes

- Samples collected by ALSI personnel are done so in accordance with the procedures set forth in the ALSI Field Sampling Plan (20 - Field Services Sampling Plan).
- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- The Chain of Custody document is Included as part of this report.

Standard Acronyms/Flags

J, B	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference



ANALYTICAL LABORATORY SERVICES, INC.

www.analyticallab.com

NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS

Workorder: 9847808 Shriver Well

Lab ID: 9847808001

Date Collected: 6/2/2010 12:30

Matrix: Water

Sample ID: Pumping Well

Date Received: 6/2/2010 14:26

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	Cntr
VOLATILE ORGANICS								
Acetone	ND		ug/L	10.0	SW846 8260B		6/11/10 20:39	DD C
Benzene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Bromochloromethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Bromoform	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Bromomethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
2-Butanone	ND		ug/L	10.0	SW846 8260B		6/11/10 20:39	DD C
Carbon Disulfide	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Chlorobenzene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Chloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Chloroform	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Chloromethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,2-Dibromo-3-chloropropane	ND		ug/L	7.0	SW846 8260B		6/11/10 20:39	DD C
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
cis-1,3-Dichloropropene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
trans-1,3-Dichloropropene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Ethylbenzene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
2-Hexanone	ND		ug/L	5.0	SW846 8260B		6/11/10 20:39	DD C
4-Methyl-2-Pentanone(MIBK)	ND		ug/L	5.0	SW846 8260B		6/11/10 20:39	DD C
Methylene Chloride	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Styrene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Toluene	3.8		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Total Xylenes	ND		ug/L	3.0	SW846 8260B		6/11/10 20:39	DD C
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Trichloroethene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
o-Xylene	ND		ug/L	1.0	SW846 8260B		6/11/10 20:39	DD C
mp-Xylene	ND		ug/L	2.0	SW846 8260B		6/11/10 20:39	DD C
Surrogate Recoveries	Results	Flag	Units	Limits	Method	Prepared By	Analyzed By	Cntr
1,2-Dichloroethane-d4 (S)	82.2		%	62-133	SW846 8260B		6/11/10 20:39	DD C
4-Bromofluorobenzene (S)	89.1		%	79-114	SW846 8260B		6/11/10 20:39	DD C
Dibromofluoromethane (S)	87.2		%	78-116	SW846 8260B		6/11/10 20:39	DD C
Toluene-d8 (S)	89.5		%	76-127	SW846 8260B		6/11/10 20:39	DD C



ANALYTICAL LABORATORY SERVICES, INC.

www.analyticalab.com

NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS

Workorder: 9847808 Shriver Well

Lab ID: 9847808001

Date Collected: 6/2/2010 12:30

Matrix: Water

Sample ID: Pumping Well

Date Received: 6/2/2010 14:26

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	Cntr
SEMIVOLATILES								
Acenaphthene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Acenaphthylene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Anthracene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Benzo(a)anthracene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Benzo(a)pyrene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Benzo(b)fluoranthene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Benzo(g,h,i)perylene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Benzo(k)fluoranthene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
4-Bromophenyl-phenylether	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Butylbenzylphthalate	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Carbazole	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
4-Chloro-3-methylphenol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
4-Chloroaniline	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Bis(2-Chloroethoxy)methane	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Bis(2-Chloroethyl)ether	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
bis(2-Chloroisopropyl)ether	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2-Chloronaphthalene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2-Chlorophenol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
4-Chlorophenyl-phenylether	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Chrysene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
mp-Cresol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
o-Cresol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Di-n-Butylphthalate	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Di-n-Octylphthalate	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Dibenzo(a,h)anthracene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Dibenzofuran	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
1,2-Dichlorobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
1,3-Dichlorobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
1,4-Dichlorobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
3,3-Dichlorobenzidine	ND		ug/L	15.2	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2,4-Dichlorophenol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Diethylphthalate	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2,4-Dimethylphenol	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Dimethylphthalate	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2,4-Dinitrophenol	ND		ug/L	15.2	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2,4-Dinitrotoluene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
2,6-Dinitrotoluene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
bis(2-Ethylhexyl)phthalate	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Fluoranthene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Fluorene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Hexachlorobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Hexachlorobutadiene	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Hexachlorocyclopentadiene	ND		ug/L	7.6	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Hexachloroethane	ND		ug/L	2.8	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1
Indeno(1,2,3-cd)pyrene	ND		ug/L	1.4	SW846 8270D	6/4/10 CAC	6/8/10 09:09	CHS E1



ANALYTICAL LABORATORY SERVICES, INC.

www.analyticallab.com

NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS

Workorder: 9847808 Shriver Well

Lab ID: 9847808001

Date Collected: 6/2/2010 12:30

Matrix: Water

Sample ID: Pumping Well

Date Received: 6/2/2010 14:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
Isophorone	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Methyl-4,6-dinitrophenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Methylnaphthalene	ND		ug/L	1.4	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Naphthalene	ND		ug/L	1.4	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Nitroaniline	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
3-Nitroaniline	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
4-Nitroaniline	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Nitrobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Nitrophenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
4-Nitrophenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
N-Nitroso-di-n-propylamine	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
N-Nitrosodiphenylamine	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Pentachlorophenol	ND		ug/L	15.2	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Phenanthrene	ND		ug/L	1.4	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Phenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Pyrene	ND		ug/L	1.4	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
1,2,4-Trichlorobenzene	ND		ug/L	2.8	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2,4,5-Trichlorophenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2,4,6-Trichlorophenol	ND		ug/L	7.6	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Surrogate Recoveries	Results	Flag	Units	Limits	Method	Prepared	By	Analyzed	By	Cntr
2,4,6-Tribromophenol (S)	73.6		%	40-125	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Phenol-d5 (S)	32.3		%	13-49	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Terphenyl-d14 (S)	71.6		%	50-122	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
Nitrobenzene-d5 (S)	73.5		%	40-110	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Fluorobiphenyl (S)	73.8		%	50-110	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1
2-Fluorophenol (S)	50.9		%	20-75	SW846 8270D	6/4/10	CAC	6/8/10 09:09	CHS	E1

WET CHEMISTRY

Nitrate-N	2.0		mg/L	0.20	EPA 300			6/3/10 17:32	J1H	B
pH	7.84		pH Units		SM4500B			6/3/10 05:11	SAD	B
Sulfate	30.5		mg/L	2.0	EPA 300			6/3/10 17:32	J1H	B
Total Dissolved Solids	323		mg/L	5	SM20-2540 C			6/4/10 13:05	KAK	B
Turbidity	1.56	1	NTU	0.10	SM 2130B			6/9/10 09:00	LMM	B

METALS

Aluminum, Total	0.19		mg/L	0.040	EPA 200.8	6/7/10	MNP	6/16/10 20:12	AJB	A2
Antimony, Total	ND		mg/L	0.0010	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2
Arsenic, Total	ND		mg/L	0.0015	EPA 200.8	6/7/10	MNP	6/16/10 20:12	AJB	A2
Barium, Total	ND		mg/L	0.0025	EPA 200.8	6/7/10	MNP	6/16/10 20:12	AJB	A2
Beryllium, Total	ND		mg/L	0.00050	EPA 200.8	6/7/10	MNP	6/16/10 20:12	AJB	A2
Cadmium, Total	ND		mg/L	0.00050	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2
Chromium, Total	ND		mg/L	0.0010	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2
Copper, Total	0.0068		mg/L	0.0025	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2
Iron, Total	0.13		mg/L	0.030	EPA 200.7	6/4/10	KMK	6/8/10 18:01	JWK	A1
Lead, Total	0.0023		mg/L	0.0010	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2
Manganese, Total	0.0055		mg/L	0.0025	EPA 200.8	6/7/10	MNP	6/16/10 15:37	AJB	A2



**ANALYTICAL
LABORATORY
SERVICES, INC.**

www.analyticalab.com

NELAP Accredited
PA 22-293 NJ PA010



54 Dogwood Lane • Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS

Workorder: 9847808 Shriver Well

Lab ID: 9847808001

Date Collected: 6/2/2010 12:30

Matrix: Water

Sample ID: Pumping Well

Date Received: 6/2/2010 14:26

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed	By	Cnt
Nickel, Total	ND		mg/L	0.0025	EPA 200.8	6/7/10 MNP	6/16/10 15:37	AJB	A2
Selenium, Total	ND		mg/L	0.0020	EPA 200.8	6/7/10 MNP	6/16/10 20:12	AJB	A2
Vanadium, Total	0.011		mg/L	0.0010	EPA 200.8	6/7/10 MNP	6/16/10 15:37	AJB	A2
Zinc, Total	0.0073		mg/L	0.0025	EPA 200.8	6/7/10 MNP	6/16/10 20:12	AJB	A2

MICROBIOLOGY

E. Coli	ND		col/100mL	1	SM20-9223		6/3/10 17:01	LLJ	G
Total Coliform	ND		col/100mL	1	SM20-9223	6/2/10 LLJ	6/3/10 17:01	LLJ	G

Sample Comments:


Anna G Milliken
Laboratory Manager



**ANALYTICAL
LABORATORY
SERVICES, INC.**

www.analyticallab.com

HELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS QUALIFIERS\FLAGS

Workorder: 9847808 Shriver Well

PARAMETER QUALIFIERS\FLAGS

- [1] Analyte was analyzed past the 48 hour holding time.



ANALYTICAL LABORATORY SERVICES, INC.

www.analyticallab.com

NELAP Accredited
PA 22-293 NJ PA010



34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

ALL SHaded AREAS MUST BE COMPLETED BY THE
CLIENT/SAMPLER. INSTRUCTIONS ON THE BACK.

Analytical
Laboratory Services, Inc.
34 Dogwood Lane - Middletown, PA 17057 • 717-944-5541 • FAX 717-944-1430

Co. Name: ADVANTAGE ENGINEERS

Contact (Name): PIERCE MACOY

Address: 910 Conroy Drive

March PA 170055

Phone: 717-478 0800

Bill to (Name and Address):

POB:

Project Name: SHRIVER, WELL

ALSI Quote #: 101334

Date Request:

Approved By:

Enail: L. P. MACOY @ ADVANTAGEENGINEERS.COM

File #:

Sample Description/Location

For a well, specify well ID and depth.

1 Pumping Well

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

Q or C

Method

Sample

Date

Time

1230

630

6/2

1230

630

6/2

1230

630

6/2

1230

630

6/2

1230

630

6/2

1230

630

6/2

1230

630

6/2

1230

Enter Number of Containers Per Analysis

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

Correct containers?

Correct sample volume?

Correct preservation?

Headspace/Vol. correct?

Container in good condition?

COCA labels completed/accurate?

Received on test?

QI present/Scale correct?

Custody Scale Present?

Circle appropriate Y or N

Y

N

Y

N

Y

N

Y

N

Y

N

Y

N

Y

N

Y

N

Y

N

ALS FIELD SERVICES

Prep

Lab

Complete Sampling

Final Container

Other

Y

N

Y

N

Y

N

Y

N

Y

N

Page 1 of 1

Center:

Tracking #:

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis

Request for Analysis